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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

March Meeting, Society of Gas Lighting.

OFFICE OF THE SECRETARY, March 3, 1898.

The March meeting of the Society of Gas Lighting will be held in "The Arena," No. 39 West 31st street, New York city, at 3 P.M., of the 10th inst.

FRED. S. BENSON, Secretary.

[OFFICIAL NOTICE.]

March Meeting, Guild of Gas Managers.

OFFICE OF THE SECRETARY, March 4, 1898.

The March meeting of the Guild of Gas Managers will be held in Young's Hotel, Boston, Mass., at noon of Saturday, the 12th inst.

A. K. QUINN, Secretary.

[OFFICIAL NOTICE.]

Fourteenth Annual Meeting, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION, OFFICE OF THE SECRETARY, COLUMBUS, OHIO, Feb. 15, 1897.

The Fourteenth Annual Meeting of the Ohio Gas Light Association will be held at Cleveland, Ohio, March 16th and 17th, 1898. The following papers will be read:

"The War of the Incandescents: Gas vs. Electric," by J. H. Maxon, Superintendent Gas Company, Gallipolis, Ohio.

"How to Avoid Competition in a Small Town," by E. G. Schmidt, Superintendent Gas and Electric Company, Sandusky, Ohio.

"Still Another Purifying Box," by Irvin Butterworth, General Manager, The Columbus Gas Company, Columbus, Ohio.

"Comparative Results with and without the Use of a Continuous Oxide Revivifier," by Moses Coombs, Superintendent Gas Company, Youngstown, Ohio.

Besides the foregoing, there will be the usual short discussions, and the members are requested to send subjects for same to the Secretary, in order that they may be inserted in the program.

The hotel headquarters will be at the Hollenden, at which place the meeting will also be held. The management of the hotel have named a rate for this meeting of from $3 to $5 per day, on the American plan, and from $1 to $3 per day, on the European plan. Street cars at the Union depot lead direct to the hotel.

Blank applications for membership can be obtained of the Secretary, who will be glad to furnish any information desired regarding the meeting. Yours truly, A. P. LATHROP, Secretary.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

WESTERN GAS ASSOCIATION, OFFICE OF SECRETARY, NEW ALBANY, IND., Feb. 14, 1898.

Mr. E. H. Jenkins, who was elected Editor of the "Wrinkle Department" of the Western Gas Association, desires that those who contemplate contributions to this valuable department should forward the same at their earliest convenience. This department is open to the voluntary contribution of all. Any unique, original or simple device, which is of value in saving labor or of affording better service, should be sent to Mr. Jenkins before March 20. It is hoped that members of the Association will have no hesitancy in forwarding their "Wrinkles" promptly to Mr. Jenkins. Address all communications to E. H. Jenkins, Engineer Buffalo City Gas Company, Buffalo, N. Y.

JAS. W. DUNBAR, Secretary.

BRIEFLY TOLD.

A PLAIN DENIAL.—The paper (see page 368) prepared by Mr. N. W. Gifford, of New Bedford, Mass., for the last meeting of the New England Association of Gas Engineers, the theme of which was "Some Incandescent Burners," led to a discussion that is entirely readable and pertinently important. Although, as Mr. Shelton said in moving a vote of thanks to Mr. Gifford, the debate could not be claimed to have

had much to do with the text of the author's lines, it nevertheless resulted in a plain denial that we are more than pleased to record. It was thought that in certain places the Welsbach Commercial Company had, in order to meet the competition of certain other incandescent gas lamp making concerns, put upon the market in a general way a mantle, not bearing its stamp nor supposed to be made in the Gloucester factories, at a price very much lower than that charged by the Welsbach Company to its regular agents for the standard line of goods. This thought, which was voiced during the discussion on the Gifford paper, elicited the following reply from Mr. Eilbeck, the Manager of the Welsbach Commercial Company: "I will repeat, in reply to Mr. Coffin, the assurance I have already given to many individuals present, that the Welsbach Company is neither selling nor offering for sale any other incandescent burner than the one bearing its trademark." That denial seems plain enough; and it certainly goes far enough.

PROPOSED INCREASE IN CAPITAL STOCK, U. G. I. COMPANY.—We understand that at the annual meeting (May 2, 1898) of the United Gas Improvement Company a proposition to increase its capital stock, from $11,500,000 to $15,000,000, will be submitted. As the new shares will be offered to holders of record, in proportion to their holdings, on the basis of par, there is every likelihood that the proposition will be accepted.

AFTER-THOUGHTS OVER THE NEW ENGLAND MEETING.—No. II.

By "ONE WHO WAS THERE."

The matter presented for the consideration of the Association's members this year was in keeping with its records. The address of President Fowler will bear careful reading, particularly that part of it which treats of the relation of consumer and clerk, upon which too much cannot be said. His experience with the decrease of gas sold per mile of main, due to the extension of the trolley systems, is one borne out by the experience of others; and his summary of the coke oven business and its probable outcome is one which sound sense and good judgment dictates. Mr. Allyn's paper on "Gasholder Construction" was in that gentleman's usual careful style. His criticism of concrete bottom construction, with the interesting discussion which followed, shows how good men can differ, and well illustrates the bearings which surrounding conditions have upon such matters. Considerable interest had been awakened regarding Mr. Gifford's paper on "Some Incandescent Burners," owing to the many incandescent burners lately put upon the market. The unfortunate accident to Mr. Gifford prevented the early printing of his paper, and the careful consideration of the results submitted, which results could only be discussed after careful consideration. It was expected that its reading would afford an opportunity for a thorough ventilation of a claimed unbusiness-like method of procedure by the Welsbach Company. Rumors of this may have reached the Company's ears, for it was represented on the floor by quite an array of gentlemen. Many of those acting as agents of the Welsbach Company were emphatic and positive in their statements and criticisms of the methods followed, and the matter would have been more pointedly put but for the absolute denial of the charges by Manager Eilbeck. His frank and free denial and explanation, and the unhesitating acceptance of his statements by the members, showed a most commendable spirit on both sides. It is only to be regretted that Mr. Eilbeck did not remove the last possible doubt by fully and flatly answering Mr. Nettleton's question, which put the case in its broadest sense. Had he understood it fully, no doubt he would have done so. Mr. W. S. Allen's paper opened the eyes of the members to what was going on abroad, and was full of interesting detail. Residence in Rhode Island seems to breed the polished orator; and the latest comer to New England's list bids fair to equal his predecessors. Mr. McGregor's "Winning Ways of Gas" was a kernel of sound meat, filled with positive, aggressive push for business. It is no wonder the trade entrusted to his charge has had such a phenomenal growth, if its detail is looked after in so close a manner. The discussion proved a hot and interesting one, and it could have been prolonged well beyond the hour for adjournment, which came all too soon. It would not be right to omit some mention of the banquet, held on the evening of Wednesday, and carried off in New England's best style. That the menu was right goes without saying, for it was at Young's Hotel. After cigars were lighted Mr. McKay took the matter in charge, and, as toastmaster, opened up a lot of gasholders, big and little, who were never excelled at a New England Association banquet, and whose sense and nonsense kept everyone in close attention till the very small hours.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—CONTINUED FROM PAGE 328.]

PROCEEDINGS, TWENTY-EIGHTH ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

HELD IN YOUNG'S HOTEL, BOSTON, MASS., FEB. 16 AND 17, 1898.

FIRST DAY, FEB. 16—AFTERNOON SESSION.

The second session was called to order at 2:30 P.M. by the President, who announced that the first business would be the reading of the paper by Mr. Walter S. Allen, on

SOME NOTES ON EUROPEAN GAS MATTERS,

which the author read as follows:

The President has insisted upon my preparing some sort of a paper for this meeting, and as at present I am entirely outside of the technical side of the gas business, the only thing I have been able to do has been to put together, possibly somewhat confusedly, some notes on the gas business as I found it in Europe during the last winter.

The first impression received in England was that the English managers made much greater efforts to do away with manual labor than was the case in America. Small operations, which here no one would think of doing in any other way than by hand, had provisions made to relieve them of manual labor. For instance, in one works where considerable coke was shipped away by rail, in laying out new works provision was made for a sunken track along the side of the coke heap, so that in loading the coke for shipment there would be no exertion wasted in raising it to the level of the car, but it could be simply shoveled over.

Much more attention is paid to mechanical methods of handling coal than with us, and even in comparatively small works, portable railway tracks and miniature locomotives are employed for handling coke and coal. This question of the economical handling of coal seems to be something which interests every one, and a paper by the Engineer of the Danish Gas Company, read at the meeting of the Gas Engineers, received more attention than any other subject. Of course, in the larger works the system of mechanical handling is much developed, and in such works as the Tradeston Station at Glasgow, the most modern station of the admirable works controlled by Mr. Foulis, neither coal nor coke is handled by manual labor from the time the coal comes into the works on an elevated railway track until the coke goes out in the consumer's wagon.

In these works the coal is received on an elevated track and dumped into a bin, from which it feeds into the coal breaking machine. From this, after crushing, it is taken by a belt elevator to the bin, from which it is fed into the hopper of the charging machine. This charging machine, operated by water under the pressure of 750 pounds to the square inch, places the coal in the retorts, and requires for its attention one man to run the machine and one to close the doors. After carbonization the drawing machine, requiring one man for its attendance, and one man to open doors, draws the coke, sending whatever is needed for the furnaces through a chute into them, and the balance is dropped through the stage floor into iron cars, in which it is drawn from the retort house by a miniature locomotive to the coke pile. After quenching it is taken up by a belt elevator to the screens, and sorted into bins placed sufficiently high above the ground to allow wagons to back up and be loaded without further handling.

Mr. Foulis claims as the entire charge for retort house labor, in which he includes the men breaking coal, the rate of 6d. a ton, say 1¼ cents per 1,000 feet. Of course, to compare strictly mechanical charging with manual charging as to cost, would require the consideration of wear and tear on retorts and tools, and interest on the cost of installing plant. Moreover, it is extremely doubtful whether such appliances could be made useful in works as small as those of our principal American cities, but it seems as if this question of mechanical handling of coal and coke has been allowed to fall into abeyance to such a degree by the introduction of water gas processes, that our engineers have neglected to apply their inventive ability to the devise of some small and simple charging machine, which might be applied to advantage in works of moderate size.

Of course the great competitor of these mechanical appliances is the inclined retort, and while I did not on this trip actually see inclined retorts in operation, I had a number of conversations with engineers, both in England and in Germany, in regard to them. The Imperial Continental Gas Association, the great English Company which con-

trols so many works on the Continent, is extremely enthusiastic in favor of the inclined retort. Established for the first time on a large scale in the works of this Company in Vienna, improved and carefully worked out by Mr. Drory, the chief engineer at that place, all officials connected with this Company give it their unqualified approval. Mr. Herring, formerly at Huddersfield, and now the engineer at Edinburgh, who has made very exhaustive experiments with it, is equally enthusiastic. But there is one serious drawback to the inclined retort, and that is the proper angle for setting the same. Every kind of coal has its own angle of slip. We all know that heaps of two different varieties of coal will present different angles of slope when the coal is piled up in the yard, and so it is with the inclined retort. In order to have the coal lie evenly along the floor of the retort, not backing up against the front end, nor refusing to properly slide down, we must have exactly the proper angle for the kind of coal with which we are dealing, and if you look at the literature in relation to inclined retorts you will find considerable variation among the authorities as to the the proper angle for setting. It is perfectly possible to use inclined retorts to great advantage if we always stick to the same kind of coal—that is, the coal from the same seam; but very few works are able always to command one and the same coal, so that the practical working of inclined retorts may present great difficulties.

The question of inclined retorts and mechanical charging is being fought out. As against mechanical charging comes the large capital cost involved in establishing the plant; as against inclined retorts the technical trouble about the slip of the coal. Strong claims are made by both sides as to the saving of cost and labor, and the results given by the advocates of the two systems are so contradictory that it is exceedingly difficult to draw any safe conclusion.

In Vienna the new municipal plant now in course of construction is built entirely with inclined retorts, but the English are more chary of committing themselves wholly to this system. One large plant where I found a new retort house in process of construction had level retorts. This station, the Aylston Road Station of the Leicester Corporation Gas Works, is one of the best arranged plants to be found. The engineer, Mr. Colson, was fortunate in obtaining a level plot of land of considerable extent, situated on the line of the railroad, and also on the line of a canal. Here he has planned and partially erected works on a large scale, and the most complete arrangements are made for every part of the business. The usual arrangements for making, purifying and storing the gas are built with due allowance for future increase, and in addition there is a large electric plant. For treatment of residuals there is a sulphate of ammonia plant with a Claus sulphur kiln and tar distilling plant, in which the tar is separated into naphtha, crude carbolic acid, crude anthracene and pitch. There is also provided a reading and recreation room for the men, fitted with a stage where entertainments are given, and daily and technical papers and games, including cards, are provided.

We are inclined to think in this country that the item of saving of labor is not a question with which the European manager has to deal, but certainly the English manager is experiencing as much trouble with his labor account as the American manager. Wages are nominally low, say $1.25 a day, but in England no gas manager of works of any size is able to make his day more than eight hours. He has three shifts, and three shifts at $1.25 a day bring the price of retort house labor very close to American prices, and when it is considered that the English manager has a selling price for his gas not more than two-thirds, and in many cases less than one-half what is charged by companies of the same size in this country, it will be seen that this high rate of labor is of very grave importance.

When some years ago, as the result of strikes, it became practically necessary to concede the 8-hour day to all the retort house labor, managers succeeded in increasing the amount of work to be done by each man to some extent, so that if eight hours' work was now paid the same price as was formerly paid for 12, the increase in actual cost to the manager was not 50 per cent., but was, we will say, from 35 to 40 per cent. This increase came all at once, and at about the same time came the strikes of the coal miners, by which the price of coal went up enormously, and not only did the price go up, but the coal was not to be had, so that managers, even in the largest of works, were sweeping out their coal sheds and saving every pound of coal upon which they could lay their hands. Moreover, the price of residuals, of tar, sulphate of ammonia and coke, fell about this time with great rapidity, so that there remained no set off against the increased cost of coal and labor. The prices of sulphate of ammonia and of tar seem destined to remain at comparatively low levels. The increase in the use of the closed oven process for the manufacture of coke with bye-product recovery, and the erection of large tar recovery plants at those blast furnaces in Scotland, which still use raw coal for iron making, which are thrown in and out of service as the state of the market allows, promise to place a limit on any substantial rise in the value of tar and ammonia. With sulphate of ammonia at the price of £7 10s. per ton, as it was last summer, none of these recovery plants take any trouble to save the liquor. With sulphate of ammonia at £10, as it is by the present quotations, all start work.

In London and Liverpool there is a system of pipes supplying water under a pressure of 1,500 pounds per square inch, which is extensively used for power purposes, and the same system on a smaller scale and at lower pressure is often found making a part of a gas company's plant. For many purposes hydraulic power is convenient, and in addition there is the added element of an efficient water pressure for fire service at all times.

Among the small appliances seen in English works for the saving of labor, I noticed an apparatus for painting holders and roofs by means of spraying the paint on, and, on investigation, I found that it was the same thing which was invented by an American engineer for the purpose of painting the great surfaces of the buildings at the World's Fair in 1893; a little apparatus run by compressed air, and throwing the paint in the form of a spray from a nozzle. This costs very little money, and yet enables one workman to paint an enormously greater surface than is the case with painting by hand. Apparently the English appreciate American inventions better than we do ourselves.

A topic always of interest to American gas engineers is the development of the use of water gas in England. This has gone on in the last three or four years very rapidly, and while in most cases the general opinion is that there is no great saving to be made by the use of water gas for enriching in place of cannel, yet every engineer agrees that its use has had the effect of holding the price of cannel coal within reasonable limits. Towns like Liverpool and Manchester, where the statutory requirements call for 20 candle gas, have been obliged to use large quantities of cannel, and for many years they have been forced to pay high prices for this material. Now, instead of the engineers being obliged to run after the coal dealers to beg for cannel, these men are offering, even in midwinter, immediate deliveries of cannel at reasonable prices.

The oil used for water gas is mainly Russian, and of the grade known as solar distillate, being somewhat heavier than our burning oils, with a specific gravity of about .840; but Manchester has recently bought a cargo of American oil, which it is enabled, since the opening of the Manchester Ship Canal, to bring directly to that city. A certain amount of shale oil from the Scotch refineries is also used.

The types of plant employed seem to be only two, the plant, as put up by Humphreys & Glasgow, and the Merrifield-Westcott-Pearson, as used by Mr. Pearson in Toronto.

Of course, the introduction of water gas started the same outcry in relation to its poisonous qualities, as was the case in this country; and, at the time I was in Edinburgh, that seemed to be the storm center, as the water gas plant there had just been completed, but not put in operation. Manchester and Birkenhead, opposite Liverpool, were also busied with this topic. In Liverpool it seemed to have ceased to create interest; and, while water gas was being supplied in summer almost exclusively, the agitation had died down.

On the Continent the widespread introduction of the Welsbach light, and other burners of a similar type, has somewhat reduced the demand for a gas of high candle power, and managers are generally of the opinion that, for the use of the Welsbach light, gases of from 12 to 14-candle power are quite as efficient as those of from 18 to 20-candle power, so that no necessity is felt for enriching by means of water gas or with cannel.

In Munich the plan of enriching by benzol still continues to be used, but only for a small enrichment, say to bring the gas from 15 to 17 candles, and it was frankly admitted that at the prices of benzol ruling last summer it was impossible to use this method, but the Company there had fortunately made a contract for a term of years for benzol at a very low rate, so that they were still able to employ this method profitably.

Apart from the lack of demand for high candle power gas on the Continent, the high price of oil places water gas outside of practical consideration, and very few engineers have studied its manufacture except in a very general way.

In Dessau, at the headquarters of the German Continental Gas Company, may be found a great variety of matters of interest. Mr. v. Oechelhauser, the Managing Director of that Company, has made of the station at that place a laboratory, and whenever anything appears

promising it is tried. Thus, when the electric light question became of interest, a plant for the production of electricity by the use of gas engines was installed, and this was speedily supplemented by a storage battery, both of which have worked very successfully. The electric light load in Dessau is peculiar; the place being the capital of a small duchy, the palace and the court theater call for considerable light, and as the theater is only open a few nights a week, and 60 or 80 lights suffice for the palace, except on gala nights when 1,000 are needed, it will be seen that a storage battery is a great convenience.

At this place I saw in active operation a gas tramway, of which all have heard more or less, but which in the last few years seems to have dropped out of sight. This is not due to any technical trouble in the development and operation of street cars by gas power, but entirely to the present competition existing among electrical manufacturing firms, by which these firms are willing to offer concessions to municipalities desiring to do away with horse cars far in excess of those which good business judgment would sanction. Under these conditions the management of the Gas Tramway Company, which is identical with that of the German Continental Gas Company, has abandoned any attempt at present to enter into agreements with municipalities for the introduction of its system, but is now engaged in working out the problem of applying gas power for use on secondary railroads, short branches where it would not be profitable to run a service of locomotives, but which furnish a reasonable amount of freight and passengers to the main lines of the railroads. For this work the gas engine is not placed inside of the car which carries passengers, as in the street railway service, but a small locomotive is built, usually with a 20-horse power engine. The tramway, as operated in the streets of Dessau, runs quietly and steadily. A slight amount of steam is emitted from the condensing water, and when the car is at rest there is some vibration from the engine, but not to a disagreeable degree, and this vibration is being lessened with each new car built.

The general arrangement of these cars is of course familiar. The engine, which is horizontal, is placed under one of the seats, and with the flywheel in the side of the car behind the seat. Under the other seat lie cylinders containing the compressed gas. On the roof are tanks for the cooling water, which after being passed through the cylinder jacket is pumped back again to the roof, and in ordinary weather this circulation keeps the water sufficiently cool for the purposes of condensation. The gas employed in these cylinders is compressed at certain points at the ends of the route by small gas engines, and is used usually at a pressure of eight atmospheres. It is a matter of only a few moments to connect the cylinders of the car with the storage reservoir at these small compressing stations and recharge, the time occupied being hardly longer than would be necessary to change horses from one end of a horse car to the other. The use of gas engines seems to be rapidly growing in Europe, and a good many are going in in isolated places designed for the use of Dowson gas. This combination is compact and easily managed, and produces power at a very low cost, it being claimed by some English authorities that by this means the cost of power may be reduced to one-half cent per horse power hour.

The relatively high cost of the engine has undoubtedly rendered its introduction in this country difficult, and now that the electric companies by their push have familiarized the public with the use of the electric motor, it will, I fear, be difficult to obtain possession of the field for the gas engine. In Europe the situation is reversed, and the electric motor is obliged to make the fight against the gas engine in control of the field.

Going outside of the works one of the most striking features, both in England and on the Continent, is the universal use of the incandescent gas light for street lighting. Towns like Bradford, in England, where 2,500 such lights are installed, like Rome in Italy, like Munich in Germany, present streets lighted very differently than those of American cities supplied with the usual flat flame, 4-foot burner. On every side one hears the greatest satisfaction expressed as to the character of the lighting, and most exhaustive studies have satisfied managers that with proper care in installation there is no excessive breakage of mantles.

Of course it must be admitted that the field for the incandescent gas light in Europe is undoubtedly far greater than it is in this country. The average candle power of the gas supplied in England, France and Germany would probably not be far from 14 as against 20 to 25 candles in American cities. The contrast between a 4-foot burner giving 12 candles, and an incandescent gas lamp burning 3 feet and giving 50 candles, is so great that their universal use becomes necessary. In Munich one of the engineers of the works stated that if I should walk through the principal streets, and look in the shop windows and at the interior of the shops as well, he should doubt if I could find a single store lighted by the ordinary flat flame burner. I spent an hour, between five and six in the afternoon, in winter, in walking through those streets where the principal retail shops are located, and saw only two stores using flat flame burners. There in Munich, where the electric light is good and reasonably cheap, we find the same state of affairs as here—show windows lighted by electric light, and the interior of the store lighted with Welsbach incandescent lights.

In Paris and in Brussels, one of the cities where incandescent gas lighting is developed to the highest degree, a few Denayrouze burners were seen. These, using gas mixers run by a motor and used without a chimney, were not, however, considered to be entirely satisfactory.

Much greater efforts are made in Europe to get the small consumer than is the case in this country. In London nearly one-quarter of the the meters of the South Metropolitan Gas Company, supplying the poorest district in London, are of the prepayment type; and it has been found that among this population of the very poor the consumption of gas will average 800 feet per month. In order to secure this consumption the Company carries the pipe into the kitchen, furnishes a stove and pipes, and connects up this, and also one burner for light free of charge, but charges enough for gas in addition to the regular rate to give from this extra charge a return equal to the interest and depreciation on the fittings.

In Paris also the Company is doing much in the same direction. It has now adopted the plan of in most cases putting in and retaining the ownership of the riser in all apartment houses, and in apartments which rent for less than $100 per year it also supplies the interior piping and meter connection free of charge.

A subject of some interest to nearly all of us is acetylene, and in Europe the development of its use has been far more rapid than here. Especially in Italy has this gas been exploited; not, however, in the form of compressed gas charged into cylinders, but in the form of calcium carbide, used for generating gas wherever it may be used.

In some small hotels I have seen the gas used for lighting the court yard and public rooms, and I understand that in this direction the Company in Milan which manufactures the carbide has been having considerable success. Milan has a weekly journal devoted entirely to acetylene, and I have recently had notice of a German journal devoted to the same subject, besides having found several very good books published in both French and German, showing far greater general interest than the subject awakens in this country.

Within a few days I have heard that certain railway trains in France and in Germany are now lighted by means of liquid acetylene. All trains of cars on the Continent of any importance are lighted by gas, while in England such use is rare. A few trains, notably on the Hungarian State Railways, are lighted by electricity. I am referring now, of course, to ordinary express trains, and not to special trains like the Orient express from Paris to Constantinople, and the Indian mail train from Calais to Brindisi, which charge very much higher fares and are fitted with great luxury.

I was fortunate enough to be able to attend a meeting of the Institute of Gas Engineers in London, and had the pleasure of meeting at that time many of the most prominent men in the gas business; and nothing can have exceeded the courtesy shown me by all engineers with whom I came in contact.

At this meeting of the Institution of Gas Engineers one of the papers which received the closest attention, and also very considerable discussion, was that of Mr. George Livesey, the Manager of the South Metropolitan Gas Company, on "Profit Sharing and the Project for a Workman Director." I presume our American Associations would consider these topics to be beyond the scope of an engineers' society, but in England engineers consider such topics to be equally of importance with those relating to the details of the works management.

Mr. Livesey is undoubtedly one of the most brilliant men in the gas business to-day, and anything which he may bring forward is presented in such an original and forcible manner that it is worth anyone's attention. When he introduced the proposition into Parliament for authority to put a workman director on the board, he was without the support of many of his own Board of Directors, and Parliament was shocked at the very idea. But by persistence he eventually obtained authority for this action, and the bill as passed provided that when the holdings of the workmen under the profit-sharing scheme reached a certain figure, the men should be authorized to choose a director. This point has now been reached, and I presume such a man has been chosen.

While I everywhere received the greatest courtesy from all I met, I am especially indebted to Mr. Livesey and Mr. Corbett Woodall in Lon-

don, Mr. Colson in Leicester, Mr. Bell in Stafford, Mr. Chester in Nottingham, Mr. Foulis in Glasgow, Mr. King in Liverpool, Mr. Thomas in Sheffield, and on the Continent to the managers of the works at Berlin, at Leipsic, at Munich, at Frankfort, at Rome and at Vienna. Mr. Wilson, the Engineer of the Imperial Continental Company, with headquarters in London, and Mr. v. Oechelhäuser, the head of the German Continental Gas Company at Dessau, were both extremely kind in giving information concerning the numerous stations of these two companies. Mr. Walter King, the editor of the *Journal of Gas Lighting*, M. Delahaye, the editor of the French *Journal*, and Dr. Bunte, of Karlsruhe, of the German *Journal*, were desirous of furnishing any information I might wish.

My queries were mainly confined to the administrative side of the gas business on topics which, while of interest to all, have, I believe, been ruled out of any papers to be read at this Association. Everyone I met was ready to answer any technical questions which I might put, and managers of municipal works and members of gas committees were extremely free in pointing out benefits or disadvantages in the systems of municipal management with which they were connected.

One of the most striking points in connection with municipal management is the great variation in the manner in which the engineers are treated by the committees. In many works the engineer is looked upon merely as a hired man to carry out the plans proposed by his committee; his advice is not asked. The committee draws the plans, buys the materials and orders the engineer to do the work, and then holds him responsible for the results, which are quite as often bad as they are good. In some works, on the other hand, and these works naturally have the best of the talent in the engineering profession, the committee consults the engineer, allows him to draw up the plans, allows him to report upon the feasibility of a scheme before it is tried, and in general treats him in such a way as to make him responsible and at the same time give him a fair opportunity to show his ability.

As an example, one large municipal works, being in need of an engineer, offered a salary so low that no engineer of the first rank was willing to apply for the place. They obtained a very good man, but yet a man not capable of originating designs for new work on such a scale as was required, with the result that in the first year a fee was paid to a consulting engineer for plans amounting to enough to have paid for three years the difference between the salary actually paid the engineer and what would have been necessary to have gotten a first-class man.

In one important respect gas works in England are managed far differently from our own. I refer to the practice of charging new work to operating expenses. The English practice, and indeed the English law, requires new work to be charged to construction, and then, after proper allowance for depreciation and a small reserve fund, it is held that all the profit made belongs to the shareholders, or to the consumers. If the profit is excessive, the law forces the reduction of price under the workings of the sliding scale, which prevents the payment of large dividends, unless at the same time the consumers obtain the benefit of a low price for gas. The result of this policy is that the present generation obtains the benefits, and does not contribute from the money it pays for gas, or, if a stockholder, from the money it is entitled to receive as dividends, amounts which enable the next generation to get cheaper gas or higher dividends. The English policy seems to me the correct one. So long as the State interferes with the selling price of gas, there is neither equity nor justice in restricting dividends in order to build up a plant out of earnings which belong to the owners of the works, that is, to the stockholders. This holds true also in the case of municipally owned works, but in this case the whole people are the owners.

I feel as if it were presumptuous for me to attempt to tell engineers what there may be on the other side of the water of technical value, but I trust it has been of some interest to you to hear of some of the points which interested me. In conclusion, I can only say that if any one can get an opportunity to make even a flying trip to England and Germany he will find many things of interest, and I think of profit; and they certainly can count on a most cordial reception from all the members of the profession in both countries.

Discussion.

The President—I think, having heard this paper, you will all be of the opinion that I was justified in insisting upon Mr. Allen preparing something for us on this subject. I believe there is in the room a gentleman who is said to have made a trip to Europe during the last summer, but who has not yet given us very many points of interest concerning his visit. We shall be very glad to hear what impressions he gained on the other side. I allude to Mr. Nettleton.

Mr. Nettleton—I was fortunate enough to get across the water last summer, but made the trip principally for my health. I only went to two gas works on my journey and what I can say will hardly be of interest. Besides, I did not know I was to be asked to take a part in the discussion of this paper, and am not prepared as I might have been otherwise. I went to Salisbury, a small city in the south of England, and there met Mr. Humphreys, who is the correspondent of the AMERICAN GAS LIGHT JOURNAL, and who was most courteous in his treatment. The thing that struck me there most was the enormous consumption per capita of population, which contradicts, Mr. President, in a measure a statement made in your address this morning. There is a small town of 16,000 people, not a manufacturing but simply a residential community; and yet they sold 78,000,000 feet of gas, or nearly 5,000 feet per inhabitant. The price was 3s. 3d. The other works which I visited were those of the old Kent Road Station of the South Metropolitan Company, and I had the pleasure there of meeting both Mr. George Livesey and Mr. Frank Livesey. In the course of our interview, he said the great thing in England to day in gas matters was the introduction of the prepayment meters. When they commenced these meters seven years ago, they had out 70,000 ordinary meters, and that number had now increased to 90,000; but in the meantime they had put out over 60,000 prepayment meters. To get this increase they had spent a very large amount of money. It had cost, including the service, meter, piping, stove, etc., very close to $30 for each consumer; but on the other hand they charge 20 cents additional for the gas sold through prepayment meters. At the old Kent Road Station, which they do not consider their best works I believe, in the sense of using the largest number of appliances for dispensing with manual labor, I saw two or three things differing from our practice. In the retort house they had benches of 10's—five retorts placed over each other. To charge the upper retorts they have a sliding stand—a stand on wheels—which moves along in front of the retorts. The lower retorts are charged from the floor the same as with us. In the yard, without cover of any kind, I saw three station meters, with practically cement cases—that is they were sunk into the ground, and instead of an iron case, as we have here, the case was almost entirely made of cement. I was told that the cost of putting up the three meters was about equivalent to the cost of one meter in an iron case of the same capacity as one of the three. Outside of that I noticed large furnaces at the ends of stacks of benches, each furnace furnishing heat for eight through benches or sixteen ordinary benches, making a saving in fuel and labor. They also recovered their sulphur there, and I saw great cakes of it, yellow, bright and clean. I think these cover nearly all the principal points of difference that I noticed as compared with our practice here—I can only add that both of the Messrs. Livesey showed me every attention and courtesy.

The President—Would any other gentleman like to speak on this subject? The subject seems to me somewhat broader, or to be looked at in a somewhat broader way than as merely the account of a European trip. The statement in the first part of Mr. Allen's paper, concerning the handling of coal and the price at which it is said to be done in Glasgow, is to me extremely interesting. I was surprised in reading the paper to see how nearly the same idea was expressed that is conveyed in my inaugural address (I consider it an extremely important point) regarding the cost of handling coal. Mr. Allen says that "Mr. Foulis (of Glasgow) claims as the entire charge for retort house labor, in which he includes the men breaking coal, the rate of 6d. a ton, say 1½ cents per 1,000 feet." That seems to me very remarkable. I judge there can be absolutely no manual labor in handling that coal. Machine labor would certainly cost as much as that. It is only 12½ cents for handling both coal and coke. As matter of interest I may state that about two years ago an association of steam users was formed in Massachusetts, and perhaps it went all through New England. Their agent who came to Springfield examined very closely into the cost of handling fuel as it was put in under the boilers of the Springfield Gas Light Company's plant, and said that there the coal or fuel was handled very cheaply. The men go into the yard after the fuel, bring it into the boiler house, throw it under the boilers, and take care of the ashes and clinker afterwards. The expense per ton of fuel was, I believe, 46 cents. I was assured by him that there were very few places in this country where coal was burned under the boilers as cheaply as 46 cents a ton. Under these circumstances it seemed to me very remarkable that coal can be put into the retorts, the retorts fired, and the clinker taken care of, at the rate of 12½ cents per ton.

Mr. Egner—I had the good fortune to meet Mr. Allen in England, and to go over very much the same ground. The last hours we spent together there were spent under extremely agreeable circumstances;

but I must take exception to some of his remarks about inclined retorts. There are some inconsistencies in his remarks upon the "inclines," for he tells us, firstly, how good they are, saying, "The Imperial Continental Gas Association, the great English Company which controls so many works on the Continent, is extremely enthusiastic in favor of the inclined retort." This is a very good statement, and I could not wish for anything more favorable for that system myself. It is in accordance with the facts as I found them. And then he says, "Every kind of coal has its angle of slip," etc. etc., which reads as if there was something wrong with the inclines after all. True; but although in each of the many works of the Imperial Gas Association the coal has its own angle of slip—after the retorts are set they can not be changed to suit the coal—and, nevertheless, as Mr. Allen says, they *are* very enthusiastic about the inclined retorts, I would like you to just "stick a pin" right there. Of course, the retort must be set at the beginning at an angle suited for all kinds of coal. I have seen them charging the common "run of mine" coal into the inclines, and it looked to be about like that description of coal which we have here; only they were a little more careful about breaking the coal than we sometimes are. One of the first things I learned in a retort house was to be careful about breaking the coal, since a neglect of that item of manufacture will affect the yield per pound carbonized. In using the inclined retort the breaking of the coal must be looked after, and if that is done there will be no trouble from angle of slip of the various kinds of coal used. As to the rest, I may say that Mr. Allen has said everything in favor of the inclined retort which I would like to have said if he had not said it so well.

The President—Some time ago I read that the inclined retorts in the Dresden works were to be altered, and that they would put their fuel in at an inclination of 32° instead of 30°. It seems to be a question of the particular kind of coal which can be used at a particular angle; and this is something which I understand Mr. Egner does not dispute. I do not suppose that any large works which can be supplied with one particular grade of coal would have any considerable trouble in using the inclined retorts. But practically we might say that retorts would have to be built at such an angle that only one grade of coal could be used in them, and another block of retorts would be built of another incline; and it would seem that neither of these retorts could be thoroughly utilized for one kind of coal, because both have not the same slope. How near right am I about that?

Mr. Egner—In Dresden I interviewed the Chief Director, Mr. Hasse, who was enthusiastic about the use of inclined retorts. I understood that the angle at which his retorts was set was 32°, and that they worked very well indeed at that angle with all grades of coal. They had arrived at that angle after considerable trial and found it was satisfactory. But Mr. Hasse said he thought it might be better if they made it a little more; and therefore in future settings he expected to make the angle 33°. But that angle (32°) is sufficient for the slip of all grades of coal, and by proper handling it will do very well. So that if you will build the inclined retort to take care of the *worst* coal, you can then charge it with *any* kind of coal, and do not require retorts set at varying angles. I have studied the methods of charging inclined retorts in use at a number of works. They would leave the lower door open for my inspection while charging, and I could look up through the retort when they charged. The coal would come down and bring up against a piece of iron left in the lower mouthpiece to hold it, and the retort would fill evenly and nicely. I never saw the coal in a retort charged so evenly by any other method, except by a charging machine (which nobody seems to remember now), built by Mr. T. F. Rowland, of Greenpoint, which was in use at the works of the New York Gas Light Company, of which I was then Assistant Superintendent. That machine was the only thing which could approach the inclined retort in nicety of charging coal. I will repeat that building the inclined retorts at the angle which is suitable for the worst slipping coal you will have no difficulty with any other; but care must be taken to see that the coal is properly broken. I saw it done in this way: The coal was dumped from a car or wagon onto a screen made of thin iron rods, which was set at an incline. What went through fell into the boot of a bucket elevator and was delivered into the overhead coal bins. The lumps slid off into a coal breaker conveniently situated, and then fell into the same boot and followed the other coal. Much of the economy referred to in this paper is due to the use of coal handling machinery, and not altogether to the inclined retort. The coal handling machinery is to be credited with very much of the saving, and that is true I suppose with all kinds of settings. I believe that the inclined retort is the coming thing. I will further say that while in England I interviewed Mr. Livesey and a number of other English gas engineers on the subject. I also saw Mr. Foulis, and let me say that I think his machine for drawing the coke out of retorts has no superior—and they all favored inclined retorts, and were intending to put them in as fast as they got a chance.

Mr. Allen—Regarding what Mr. Nettleton had to say about the prepayment meter, I want to add thereto what I learned at Paris. There, in the space of two years, they put out 71,000 prepayment meters, in connection with apartments where the rental is less than 500 francs a year. During the year 1896 (the last report of the Paris Company which has appeared) the consumption by those 71,000 consumers amounted to 16,500,000 cubic meters (575,000,000 cubic feet), or an average of 8,000 feet per year per consumer. This is what is supposed to be a class of tenements so poor that they cannot afford to put in their own gas supply. With gas in Paris at about $1.70 per 1,000 cubic feet, it makes a very large amount, and shows what can be done with the prepayment meter. In Sheffield, England, I was told they found no use for prepayment meters; that they used only the ordinary meter, and that they had a very large number of consumers in proportion to the population. It was said that because of the stability of the main Sheffield trade occupations (cutlery making and silver plating), nobody ever moved away from the city, and, therefore, no matter if a man moved from one place to another in the city, he always became a consumer. They never had any trouble in collecting bills; they always got their pay, because the people did not move away from Sheffield. In this respect it is quite different from many other English towns. Mr. Nettleton referred to Mr. Livesey's benches of 10 retorts—I do not know whether Mr. Livesey told him this story, and so I will tell it: When the old Imperial Company wanted to increase its plant at Fulham (which is located next to the palace of the Bishop of London), the Bishop got a bill through Parliament forbidding the putting of any more buildings on that particular piece of land; and so, in order to extend their works, they were obliged to build their benches higher. In that way the South Metropolitan Company has what are called by Mr. Livesey the "Bishop of London settings." Mr. Foulis is putting into the Glasgow works benches of 12 retorts, in 4 tiers of 3 retorts each. With the charging machine there is no reason why they cannot charge the upper retorts as well as the lower. It struck me, in seeing his charging machine, that there was a chance of increasing the wear and tear of the retorts; but he claimed that they are so perfectly balanced that the wear and tear is really less on the upper retorts than it is in the ordinary method of charging retorts. The scoop goes in so smoothly, and the rake being always kept horizontal, there is no wear and tear on the retorts. Mr. Egner and I seem to agree with regard to the degree of slope. He admits my proposition that retorts have to vary in angle according to the kind of coal used. In one place the retorts had to be all taken out and reset because the angle was such that the coal there in use would not work at all. If you look up the English, German and French literature on the subject of inclined retorts you will find that various people have endeavored to find out the angle that can be advantageously used. Some fix it at 31° and others at 29°, claiming failure in one case and success in the other. Even Mr. Herring, who has probably made the most extended tests of inclined retorts of anybody in England, was perfectly willing to admit, and indeed was the one who made the suggestion, that it was necessary to be very careful about your coal, as otherwise you ran a great risk of lack of success. I think that undoubtedly inclined retorts, in works which are too small to use charging machinery to advantage, can be made a great success, and in those works it is usually possible to secure one and the same coal; but in large works, and especially in those situated, as many are, in the Midland coal districts of England, where they get 1,000 tons of coal from one man and 10,000 tons from another, or are using 40 or 50 different kinds of coal, as they do in Glasgow, it seems to me this question of the slope of retort is one which must be very seriously considered.

Mr. Egner—Mr. Allen says I agree with him. That is not so. I think the record will not show it. What I say is that if you get the right angle for the poorest slipping coal, then the good slipping coal will be taken care of. That angle has been found to be 32°. I have had considerable practical experience with inclined retorts, in addition to seeing them and looking at them with the eye of a gas man in many of the gas works in Europe within the past year; and that is what I have found—if you get the right angle for the *worst* coal, then that angle will do for *all* kinds of coal likely to be used.

On motion of Mr. Nettleton, the thanks of the Association were voted to Mr. Allen for his paper.

Election of Officers.

Mr. Lamson, Chairman of the Committee on Nomination of Officers for the ensuing year, reported the following nominations:

President—Samuel J. Fowler.
First Vice-President—Walter R. Addicks.
Second Vice-President—Waldo A. Learned.
Secretary and Treasurer—C. F. Prichard.
Directors—N. W. Gifford, F. S. Richardson, A. J. Purinton, J. A. Coffin and William E. McKay.

On motion of Mr. Harbison the report of the Committee was accepted, and the Chairman of the Committee was instructed to cast the ballot of the Association for the election of the nominees. The ballot was cast accordingly, and those named in the report were declared to be duly elected as officers of the Association for the ensuing year.

AN ASSISTANT TO THE SECRETARY.

On motion of Mr. Harbison, seconded by Mr. Lamson, the Secretary was authorized to employ an assistant in the performance of the duties of his office, and to pay such assistant the sum of $50 per year for his services.

CONSTRUING THE CONSTITUTION.

Mr. Lamson—Mr. Allyn and myself were appointed a Committee to consider the question of some change with regard to Article 4 of the by-laws in relation to the election of members. There seems to have been some trouble in the last few years, when applications have been made for membership, in determining who shall be active and who shall be associate members. If we seek to amend the Constitution in such a way as to make the designation as to the two classes of membership more definite it will require an amendment to be proposed this year to be acted upon next year which would prolong the thing, and would give the same trouble to the Directors next year as they have had this. We, therefore, offer the following construction of that Article for your consideration :

Voted, That it is the sense of this meeting that Article 4 of the Articles of Agreement (relating to the election of members) should be construed to mean that an applicant for active membership in this Association must be a resident of New England ; he must have practical knowledge of the mechanical or chemical questions relating to the manufacture of gas, control of works, or the distribution of gas for lighting and heating, as a distinction from the applicants who have to do with the business management of corporations, or other matters not closely connected with the manufacturing department.

C. D. LAMSON, } Committee.
H. A. ALLYN, }

The President—The question as to just who are included in the statement of Article 4 that "Any New England gas engineer may become an active member," is one that has been raised before the Directors in considering applications for membership every year since I have been a member, some eight years now ; and in order that the Directors may be relieved from the continual discussion and consideration of this subject this interpretation of Article 4 has been requested by the Directors.

Mr. Harbison—I move that the proposed vote be laid on the table until our next annual meeting and be published with our proceedings so that we may have time to carefully consider the subject. Any proposed change in the admission of members is an important thing, and deserves the consideration of all the members of the Association. We should not act upon this important matter hastily, but should have time to consider it and be prepared to act upon it intelligently a year from this time.

Mr. Allyn—I hope this motion will not prevail. It seems that every member of the Association should understand the matter pretty thoroughly at this time, for it has been discussed every year since I have been a member of the Association—some 20 years or more—and it is brought up at this time simply to get an expression of the views of the members as to the qualifications which make a man eligible to election as an active member of this Association. In these days when gas companies are changing ownership so often it seemed to some of us we ought to narrow the thing down to what we understand was the original intention when the Association was organized—that it should be composed of men actively engaged in some branch of the manufacture or distribution of gas ; and, above all, that they should be residents of New England. I heard one gentleman remark that this proposed interpretation of that article would rule out about one-fourth of our present members ; but it is not intended to affect any person at present an active member, but only those who may hereafter apply for membership.

The President—Its sole purpose is to show more clearly who may become active and associate members.

Mr. Harbison—Does not our present Constitution clearly state who may become active members ?

Mr. Lamson—It does not clearly state it, which is the reason we ask that Article 4 shall be clearly defined. No one can determine it from the reading of the Articles of Agreement as they now are. It seems to me we are as well prepared to vote on this to-day as we shall be next year, if it is now laid on the table and brought up again at that time. If not acted upon to day the Directors will be in the same position next year as they have been heretofore.

Mr. Harbison—Does not Article 4 cover the ground fully by saying that "Any New England Gas Engineer may become an active member ?" The Secretary of a company is not necessarily a gas engineer. Is it not simply a question for the Directors to decide when recommending an applicant for membership whether he is a gas engineer ? Are they not competent to decide that question, and can they not do so without asking the Association to put an interpretation upon our own language ? Article 13 provides that—

"These articles may be altered or amended at any annual meeting, notice of such proposed change having been given to the Secretary, at least 30 days previous to such meeting, and by him communicated to all members at least one fortnight previous to such meeting."

Are we now going to put a new interpretation on Article 4 on impulse, and without the requirements of Article 13 being carried out ? Is not our Board of Directors (knowing from long experience as members just what the wishes of the Association are) competent to intelligently define what a gas engineer is ? Are they not competent to decide whether a man is eligible to election to active membership, whether he be the president of a gas company, a clerk in the office, or a collector of bills ? If this Article means anything it means that a man who is engaged in the business of making and distributing gas, and who is competent for the position he fills, is eligible as an active member of this Association. The Directors will determine that question. That is what we have them for, in part. It is not proper for the members of the Association, on impulse, to put an interpretation on every phrase in the Constitution, and on every section of every Article. The Directors will do that. If we find them at fault in doing so we can call them promptly to account.

The President—I understand that the gentleman has no objection to the wording of this vote ; and that he approves of the definition as given in the motion made by Mr. Lamson.

Mr. Harbison—I think the Association will understand that that is the correct definition and meaning of Article 4.

The President—Inasmuch, then, as the Directors have not understood Article 4 as you do, and as they now desire a definition which is exactly in accordance with your opinion, I can only consider your speech as affirmatory of the motion.

Mr. Harbison—Pardon me. We have not yet had an expression of opinion from the Board of Directors. We have not even had a suggestion from them. We have elected them within the last 15 minutes ; and I think it is fair to assume that we have now elected an intelligent Board. If the Directors heretofore have not been able to understand this Article, it is to our discredit that we elected such Boards. We have not yet heard anything from the new Board. I move to lay this motion on the table.

Mr. Addicks—I belong to the past members of the Board of Directors as well as to the present, so that possibly I may speak on this question. I was unfortunately absent from the last meeting of the Board, and this is the first I have heard said on this particular subject. The only reason I have heard advanced in favor of this proposed interpretation is the one given by Mr. Allyn. I am afraid that if the Association were to take that position we might exclude from membership some of the brightest minds we have in the gas business, and I think we should hesitate to take a position which would compel us to do that. The question has been before the Association many times, and if my memory serves me right members have been elected who were not residents of New England, although they had been members. Although I am in favor of meeting the question and deciding it, still I think it might be well to lay this motion on the table until some future meeting, particularly as it may involve an amendment to the Constitution.

Mr. Lamson—I would like to ask Mr. Addicks what "bright minds" would be shut out by such a vote as this. The only bright engineers who would be shut out would be those who are not residents of New England. I understand it to be the desire of the members of the Association generally that this shall continue to be distinctively a New England Association. Other than that I do not see how any bright-minded engineer is going to be shut out by this proposed definition of the meaning of Article 4 as to who are eligible to election as active members. If a resident of New England, connected with industries pertaining to the gas business, is not eligible to election as an active member, he can still be elected as an associate member ; and there is

really no difference between the two classes, except in the right to vote and to hold office.

Mr. A. P. Brown—It seems to me that the adoption of this amendment would tend to increase the difficulties under which the Directors now lie. At present they have only to ascertain if an applicant is a resident of New England, and is a gas engineer; if this amendment is adopted it will become necessary also to ascertain whether he knows anything about his business. (Laughter.)

The President—The question is on the motion of Mr. Harbison, that this resolution offered by the committee be laid on the table until the next annual meeting, and that the proposed vote be printed in our proceedings.

The Secretary—I would suggest that if it is to be held over until next year it should not then appear in this form, but in the form of an amendment to the Constitution. Then if it be adopted it can go into effect at once.

Mr. Harbison—It is proposed to amend the Constitution, very well; but I do not understand the Committee to propose this as an amendment to the Constitution, but as an explanation or interpretation of an Article of the by-laws. Therefore, I moved that it be laid on the table, and printed in our proceedings, so that we might be ready to take it up at the next meeting and act upon it intelligently.

The question on the motion of Mr. Harbison was determined in the negative.

Mr. Coffin—As I understand it, all that the Directors want is an expression of the sense of this meeting as to the construction of that by-law. Suppose the sense of the meeting is taken as to the sense of that by-law; does not that cover the whole point?

The President—It practically covers the point. They simply desire an explanation of this thing which has bothered the Board of Directors for the past 20 years.

Mr. Lamson—The Directors simply desire to carry out the wishes of the Association. They desire to act in accordance with the by-laws, but they have had some doubt as to what that by-law means.

The President—As President, and as a member of the last Board of Directors, I may say I believe this definition offered by Mr. Lamson is in exact accordance with the original intention of this Preamble and Articles of Agreement; but I wish to have it defined by the Association, if possible.

Mr. Harbison—Does this come before us as a recommendation offered by the Board of Directors of last year, or is it an individual affair?

Mr. Lamson—Let me state that during my absence the Chair appointed a Committee (Mr. Allyn and myself) to consider this Article, of which Committee I was made Chairman. We decided that the simplest way was to propose, for the Board of Directors, an interpretation of the meaning of Article 4. It is impracticable for every member in this room to say what his opinion is in regard to the meaning of that Article, and so we suggested an interpretation of that Article, which we ask the members present to consider, and then say whether they agree with it. This seems to us to be the common sense interpretation of that Article; and as such we present it.

Mr. Allyn—The gist of Mr. Harbison's argument seems to be that he believes exactly as the recommendation proposed, but he does not want anybody else to believe the same way that he does.

Mr. Harbison—Mr. Harbison's position is this: He expects every member of the Association to believe as he does; not that he doesn't want anybody to believe as he does, but he expects all to believe as he does, because he always believes that he is right. When it was said that our Board of Directors could not interpret Article 4 of our by-laws, I inquired whether they had asked us to give them an interpretation. It now seems that they have not asked for any such thing. But the President has suggested there has been difficulty in the Board in interpreting that Article, and so he appointed a committee to recommend an interpretation for the benefit of the Board of Directors. Yet the Board of Directors did not all know that this matter was coming up, and it seems that the members who did not know it had no difficulty in interpreting the Article. I am perfectly willing, for the benefit of the President and of the committee, and of any other members who are like-minded, that we should put an interpretation, in our own language, upon the record. And if the committee want Mr. Harbison to vote for their recommendation, that will show that they have great confidence in his judgment and that they expect all the rest to do as he does. If this recommendation is intended simply as an interpretation of Article 4, very well; but if it is proposed as an amendment, then I wish to call your attention to the requirements of Article 13.

Mr. Lamson—The first line of this is: "Voted, that it is the sense of this meeting;" now, what do you want more?

Mr. Neal—Several years ago, when I was Secretary of the Association, this matter came up before us, and I recall that, when the name of Mr. Bradley, who is now Chief Engineer of the Consolidated Gas Company, of New York, but who at that time resided in Connecticut, the question with me was, "Shall I put his name in the list of members?" I was advised to do it in this way: I put his name on the list as residing at Meriden, Conn., and then put this note at the bottom of the page on which his name appeared: "Now Engineer of the Municipal gas works in New York." That is the way we got over it then.

The resolution offered by the Committee was then adopted.

The President announced that as Mr. N. W. Gifford, of New Bedford, Mass., was detained at home by an unfortunate accident, his paper, on the subject of

SOME INCANDESCENT BURNERS,

would be read by the Secretary. On motion the Secretary was instructed to convey to Mr. Gifford an assurance that the Association sympathized with him in his affliction, and its sincere hope that he would speedily recover from his injuries. The Secretary then read Mr. Gifford's paper as follows:

The incandescent gas burner has become such a prominent factor in the lighting problem of to-day, and is so well known, that I shall not attempt any historical or scientific description of it; neither shall I discuss the legal standing of the various burners which are now flooding the market. This paper is the result of an inadvertent showing to your Secretary of some notes made on the candle power of some incandescent burners.

I cannot vouch for each of the herein mentioned burners being of distinct and separate manufacture, except that the samples tested were bought in the open market and under individual names. I am told that in New York city there are about 40 burners, each with a different name, on the market, and it is not impossible that some of them differ only in name. I have simply taken each new burner as it has come to my notice and into possession, and tested it on the photometer, and some of the results are herewith presented for your consideration, in the hope that some of you may see something of interest therein.

In most cases the burner itself seems to have no special claim for preference, but the claims for superiority are mainly based on the mantles. In one or two cases claim is made for increased efficiency in the burner itself. One claims to effect regeneration, and it does show a higher efficiency than other burners with the same mantles.

Burners with a solid button in the center of the gauze head give a higher efficiency than those with a plain gauze. Apparently the button in the center causes the flame to rise in a hollow cone, and thus heat the mantle with less gas than when the solid cone of flame stands over the plain gauze.

There is a burner described in the AMERICAN GAS LIGHT JOURNAL of October 10, 1897, where especial attention is given to the introduction of the air supply, and great gain in efficiency is claimed. I have not been able to get a sample of this burner to test, so can only refer to the published results.

In the following tests the burners were measured against a standard Sugg Argand, the candle power of which was determined previous to each test. In this way more satisfactory results were obtained than by testing against a smaller standard. Absolute accuracy is not claimed, but the conditions of ordinary practice are believed to be fairly shown as far as the tests go. The photometric work was mostly done by our chemist, Mr. Robert Lindsay.

The annexed tables show the names of the burner, the name of mantle, the number of hours it had been burned at time of test, cubic feet of gas burned per hour, candle power given, candle power per foot of gas burned—which is the efficiency of the burner—the candle power of the standard light, the specific gravity of the gas, and in some cases the pressure at which the gas is delivered to the burner check. As it is almost impossible to get mantles to light up uniformly on all sides, the candle power given is the average of three sides.

No. 1 in the table is a Welsbach, bought in May, '96. It had a very small mantle and small gas way, and thus far takes the lead in efficiency of anything which I have tested.

No. 2 was a larger mantle obtained a year later.

Nos. 6 and 7 show the difference between first lighting up, and after 400 hours' continuous burning. It may be remarked that a continuous burning for a given number of hours may not produce the same effect on the life of the mantle as the same number of hours' burning in actual use with the attendant shocks of frequent lighting and the disintegrating effect of many heatings and coolings.

Nos. 8 and 9 represent a burner in actual office use, from 10th

No.	Name of Lamp.	Name of Mantle.	No. Hours Burned.	Feet Gas per hour.	C. P. of Lamp.	C. P. per cubic foot.	C. P. of Standard.	Sp. Gr. of Gas.	Press. of Check.	
1	Welsbach	Welsbach	——	2.22	63.36	28.5	18.08	.504	——	
2	"	"	——	3.8	68.18	17.94	17.	.493	2.73	
3	"	"	——	5.	68.41	13.48	18.54	.498	3.1	
4	"	"	——	3.	61.01	20.3	17.01	.532	——	
5	"	"	——	3.	54.43	18.14	18.9	.526	——	
6	Sunlight	"	——	3.	64.07	21.3	18.9	.526	——	
7	"	"	400	3.	49.32	16.34	18.16	.489	——	
8	"	Sunlight	——	3.	56.10	18.7	19.8	.560		
9	"	"	10th mo., 22, to 1st mo., 18.	3.	37.77	12.57	16.89	——	1.7	
10	"	Didymium	——	3.2	60.83	16.	20.15	.520	2.1	
11	"	"	——	2.9	49.74	17.15	20.15	.520	2.1	
12	"	"	100	3.25	55.06	17.	19.1	.580	2.1	
13	"	"	223	3.2	49.6	15.5	19.1	.521	——	
14	"	"	320	3.26	52.52	16.1	20.	.521	——	
15	"	"	420	2.52	43.56	17.28	19.8	.596	——	
16	"	"	520	2.28	50.94	15.5	18.8	.530	——	
17	"	"	620	3.6	51.41	14.3	18.56	.520	——	
18	"	"	744	3.	38.68	12.89	18.51	.510	1.5	
19	"	"	844	3.	44.59	14.81	19.6	.505	2.4	
20	"	"	1244	3.	47.79	15.93	20.06	.510	1.8	
21	"	"	1392	3.	46.84	15.6	20.	.521	1.5	
22	"	"	1492	3.	47.67	15.89	19.3	.515	1.7	
23	"	"	1592	3.	5.04	16.8	20.	.524	1.8	
24	"	"	1692	3.	48.51	16.17	20.3	.521	1.8	
25	"	"	1792	3.	41.21	15.73	18.66	.542	1.8	
26	"	Daylight	——	3.	32.13	14.04	18.4	.522	1.8	H. & D.
27	"	"	200	3.	30.01	10.	17.76	.528	1.7	
28	"	"	420	3.	31.07	10.35	18.09	——	1.7	
29	"	"	520	3.	32.02	10.67	19.1	——	1.8	
30	"	"	300	3.	30.21	10.07	17.2	.522	1.7	
31	"	"	600	3.	31.59	10.19	18.16	.489	——	
32	"	Apollo	——	3.	49.86	16.62	17.8	.523	——	
33	"	"	120	3.6	65.14	18.09	17.8	.523	——	
34	Welsbach	"	120	3.	38.14	12.41	17.56	.521	——	
35	Daylight	Star	——	3.	36.69	12.23	18.6	.521	——	
36	"	"	——	3.7	54.95	14.8	18.6	.531	——	
37	"	"	100	3.7	41.16	11.12	17.95	.515	——	
38	"	"	220	3.7	45.50	12.3	18.37	.510	——	
39	"	"	420	3.7	41.04	11.08	18.16	.492	——	
40	[Incandescent Gas Burner]		——	2.76	32.66	11.8	18.12	.493	2.7	
41	Victor	Victor	——	4.3	89.9	20.9	18.9	.526	——	
42	"	"	——	3.9	88.69	22.7	18.9	.526		
43	"	"	——	3.6	66.52	18.4	18.9	.526		
44	"	"	——	3.	60.66	22.22	18.9	.526		
45	"	"	400	3.9	49.03	12.6	18.16	.589		
46	"	"	500	3.9	52.24	13.3	19.28	.515	1.5	
	Bandsept, as per American Gas Light Journal, Oct. 18, 1897.									
47	"			3.67	10.99	29.95		.205		
48	"			3.09	88.8	28.74		.118		
49	"			2.95	83.2	28.54		.98		

month, 22, '97, to 1st month, 18, '98, lighted until 6 P. M.; and while it shows quite a loss in efficiency by the photometer, yet the loss is not very apparent to the eye.

Nos. 10 to 25 show the constant burning of a didymium mantle for the times set forth.

The Daylight, Apollo and Star seem to be rather low in efficiency.

No. 40 came to my attention about two years ago. The burner was rather a clumsy affair and the mantle seemed to have a low efficiency.

Nos. 41 to 46 show the Victor, which claims some regenerative features, and, from a gas seller's point of view, it has some advantages, in that it takes more gas than the others and yet gives a high efficiency. It might have a field in store lighting and such work, if its other characteristics are satisfactory.

The efficiency of the Bandsept is higher than anything I found with the exception of No. 1.

I have examined quite a number of other mantles, but some of the samples appeared to have suffered so much in handling that they would not bear lighting up. Another lot of mantles with no name attached gave very fair results for efficiency when first lighted, but every one broke its chimney when set into actual use, hence they were not regarded with favor.

The wide chimney seems to find favor with many as a means of extending the life of the mantles, and one I have in use seems to give as good if not better light than the small straight chimney, so I tried it on the photometer with the following results.

Name of Burner.	Name of Mantle.	Gas per hour.	Candle Power.	Candle Power Per Foot. Straight Chimney.	Large Chimney.
Sunlight	Daylight	3.	40.48	14.04	13.49
Welsbach	Welsbach	3.	40.07		13.35
Sunlight	"	3.5	59.3	17.66	17.
"	"	3.3	56.76	20.	17.7
"	"	3.	51.6	18.	17.1

Hence it would seem that the photometer is against "the improved combination globe chimney," yet its effect of lengthening the life of mantles may overcome the prejudice of the photometer.

In connection with this question it may be of interest to quote from some tests of high power kerosene lamps and to note the comparative cost of light from oil and gas.

A "B & H" piano lamp, of nominal 80 candle power, gave 37.64 candle power on a consumption of 5 ounces of oil per hour. This, at 12 cents per gallon, would cost 46-100 cents per hour.

A "Juno" lamp, such as is used for stores and other large spaces, with a nominal rating of 300 candle power, gave 52.91 candle power, on consumption of 6 1-2 ounces of oil per hour, costing, at 12 cents per gallon, 61-100 cents per hour.

It would seem that such figures as these might be used to advantage in presenting the "Winning Ways of Gas" to an oil using public.

Discussion.

The President—You have heard a very interesting paper, and I very much regret that Mr. Gifford is not here to talk over these burners with you. He would have very much enjoyed telling you about his various experiments, and the ways in which he obtained the burners, also the manner in which all these photometric results were obtained. The paper is now open for discussion.

Mr. Lamson—I do not propose to discuss the general question, but I would like to get some information. Several gentlemen present are connected with the Welsbach Company, and I hope they will tell us about the Welsbach light, having special reference to the value of that light as compared with the light of these various burners which are being presented to our attention. There seems to be some little talk about the question of patent rights, which we would be glad to be enlightened upon; and we would also like to hear something upon the general situation of incandescent lighting.

The President—Will Mr. Eilbeck take the floor?

Mr. Eilbeck—I do not know that it would be quite proper for me at this time to reply fully to Mr. Lamson. As to discussing the tests made by Mr. Gifford, the results of which are presented in his paper, I may state that, unfortunately, owing to his accident, we were unable to obtain a copy of his paper, and therefore are not prepared to discuss the points presented. I will say, however, that our experts have tested these burners from time to time as they have appeared. The results of our tests have also shown that none of those burners will anywhere near approach the Welsbach, either in efficiency, candle power per foot of gas consumed, or in length of life of the mantle. Mr. Gifford has pointed out what is a very general objection to most of these burners, and that is the fact that they do not stand transportation, and consequently the percentage of breakage is very excessive. I do not think it would be proper for me at this time to discuss the question of our patent litigation. I will say, however, that, as many of the members present already know, we have, since early in the month of December last, been in daily expectation of a decision in the patent suit which was argued last November. The decision has been unfortunately delayed, owing to the illness of the judge before whom the case was tried. Our expectation now is that it will be handed down in a few days. Our confidence that this decision will sustain the Welsbach patent is fully justified we think by the favorable decisions in similar suits tried elsewhere.

For some time we have had in contemplation certain changes in our methods of doing business, which we think will go far toward removing that unsettled condition which has existed so long owing to the time it has taken to try these suits. We have deferred announcing any such changes or referring to them in any definite way, owing to the fact that the nature and extent of the changes will be determined largely by the nature of the expected decision. We now hope, as I have said, that the decision will be given in a few days, and then we will be prepared to announce a definite change of policy which we think will be accepted by all our agents as entirely satisfactory, and which will also aid us in eliminating from the field the burners which have been infringing our patents. Of course it will take a little time to remove them all from the field, but we are prepared to take prompt action; and, whatever the decision may be, I think our agents may rest assured that it is our intention to make whatever changes of policy that may be necessary to place them on a satisfactory basis. I may add other suits are pending which are hardly secondary in importance to this first one, and which will be argued early this spring, and in which we expect that decisions will be handed down sometime before the summer. If they go as we confidently expect them to go, then there will be no question about our patent rights being protected for a great many years to come. I presume most of the members present appreciate the fact that the progress of patent litigation is necessarily slow, owing to the congested condition of the courts. While some of our agents may have felt themselves justified in criticising apparent delays on our part, I can assure them that every possible advantage has been taken by our lawyers which the law permitted them to take; and that the suits have been advanced as rapidly as possible, and I think more rapidly than any similar litigation which has ever taken place in this country.

The President—Is the suit in which you expect an early decision a motion for preliminary injunction?

Mr. Eilbeck—No; it is the final hearing of the case; and peremptory injunctions will probably follow inside of forty eight hours, if the decision is in our favor.

Mr. Coffin—I have something to state on this topic, and it has come to me from an authority which I can hardly question. It is the statement that the Welsbach Company has placed upon the market a cheap burner—not through their agents but through the department stores—and that they are offering them at such a price that the Welsbach Company is acting in competition with its own agents. I have a sample of the burner here; and if it is not made by them or at their factory, it is so close an imitation that I would like the members to look at it and see if they can detect the difference. This burner can be bought for 35 cents, all complete, as against $1 which is charged by the regular agents of that Company. I brought the burner here, knowing there would be representatives of the Welsbach Company present, in order that I might confront them with what I believe to be the facts in the case, and give them an opportunity to explain them away if they can. I will say that the Company I represent has been the regular agent of the Welsbach Light Company for about four years, and we have never sold any other burner than the Welsbach, and never have sold a mantle that did not come from their factory. We have kept faith with them; we are afraid they have not with us. I would like them to look at that mantle, and then decide in their own minds (if they did not make it) whether the fellow did not come pretty near imitating their mantle. We have tested this mantle in every respect except its life (we did not have time to do that), and for efficiency, general effect, and rate of consumption it is identically the same as the Welsbach; and the parts of the two burners are interchangeable.

Mr. Eilbeck—I will repeat, in reply to Mr. Coffin, the assurance I have already given to many individuals present, that the Welsbach Company is neither selling nor offering for sale any other incandescent burner than the one bearing its trademark. It is extremely unfortunate that there seems to be a disposition upon the part of some members to believe, as Mr. Coffin does, that the Welsbach Company did not keep faith with its agents. It is not so. Both the Welsbach Light Company and the Welsbach Commercial Company appreciate as fully as they possibly can that their interests and the interests of those handling their goods are and must be identical. Anything which makes for their disadvantage must so make for ours. This same charge has been brought up and made to me in connection with every incandescent burner which has been offered on the market, practically, without exception. I do not think I can add anything to what I have said.

Mr. Coffin—Straws indicate which way the wind blows, and something happened us lately that rather strengthened my belief. We bought some Welsbach lights lately, and, very strange to relate, they had the same chimneys—the Acme—that the imitation lights had. It really looked as though they got mixed up in the packing. (Laughter).

Mr. Rossman—We are in receipt of circulars offering the incandescent burners for 30 to 36 cents, and we also have circulars offering the brass parts for 18 cents. I would like to ask the Welsbach Company why they ask gas men of New England to pay $1 for something that other companies sell for 30 and 36 cents. They tell us about patent decisions; but we have had all that experience in the electric business. In that decision the court said that it would not deprive our people of the right to make electric lights, but simply that we must pay a small royalty; and that if the parent company tried to charge us an exorbitant royalty the court would protect us. To-day those outside companies pay only 1½ or 2 cents for the privilege of making electric lights. Suppose the Welsbach Company obtains a decision in its favor, then these outside companies will have to pay the Welsbach Company a royalty of only two or three cents per burner, and then the courts will protect us in using those infringing lamps. The other companies say they are making a good profit at the price of 36 cents.

Mr. Harbison—This discussion should not take the form of an accusation by individual members of this Association against the Welsbach Light Company. As I look at it the question of interest to New England gas managers, and to gas managers throughout the country, is simply this: How can we best compete with the electric light, and particularly, incandescent electric lighting, in the sale of gas? The answer is, By using the incandescent gas burner; but the price we have had to pay for incandescent gas burners heretofore has made the use of them almost prohibitory to the consumers of gas. The gas company feels that at that price it cannot afford to give away the burners. Incandescent gas burners costing from $1.25 to $2.50 each, according to the outfit, means quite an outlay for the average consumer, if he needs a half dozen or a dozen burners in his house or store. How can that obstacle to the more general use of the incandescent gas light be overcome? Now I may say that in dealing with the Welsbach Company you are dealing with gentlemen; I have always found them so. I have never had occasion to question their word in respect to any statement they ever made to me. To-day for the first time I hear the suggestion that an imitation burner, offered at a very low price, has been put upon the market by that Company. I have no doubt whatever that that statement was made honestly and in good faith by the gentleman who made it. At the same time, open and above board, the Manager of the Welsbach Company says that it is not so. There is no good reason for doubting his word. My acquaintance with him led me to believe that he is a perfect gentleman, as

are all the men who are connected with that Company, so far as I have become acquainted with them—and I have quite an extensive acquaintance with them. The prime question with us as gas men is: What can we do to get incandescent gas burners that will satisfy our people and enable us to sell more gas? That question has been answered, and is being answered day by day, by people who brought to our notice a burner that is being sold in Hartford in very large numbers within the past three or four months, and the sales are increasing very rapidly. The number of burners of various makes is being increased from day to day. The Hartford Gas Company has never sold or dealt in incandescent gas burners, for the reason that the Welsbach Company saw fit to establish an agency of their own in our city to which we do not object and have not objected, except when we thought the business was not being pushed sufficiently for anybody engaged in the gas business—we consider that the selling of burners is a part of the gas industry. We called the attention of the Welsbach Company to that fact, and efforts were made to improve it, and the business has been improved; but still their prices are away beyond what most people feel they can afford to pay, and are very much beyond what other people are selling their burners. To the naked eye it is very difficult for anyone to tell which is the better burner, so far as light giving power is concerned. We have in Hartford, as some of the members know, a modest but convenient office building—for a gas company. At the front we have a plate glass bay window; across the inside of that window runs an inch pipe perforated with stems on which to place gas burners. In that window to-day are four different sorts of incandescent gas burners—a section being allotted to each make of burner. We furnish the gas; they furnish the burners; and they are there on exhibition. The window is lighted, from dark until ten o'clock, six evenings per week. We show samples of gas stoves in the same window. People can look at the burners and judge for themselves. A card hangs by each burner stating whether it is the Welsbach, the Standard, the Apollo, or whatever burner it may be. Burners that seem to be just as good in light giving power as the Welsbach, and rigged up in the same way, so that you cannot tell which is which except for the sign, are sold for less than one-half what the agent of the Welsbach Company demands for the Welsbach burner. The result is that large numbers of the low priced lamps are being sold. The department stores have them for sale. Within the last 10 days burners have been sold complete for 59 cents; one store advertised them for 49 cents. I visited one of those stores at the time of these sales, and they ran a whole week at 65 cents for the outfit. There was a crowd around the particular department where they were being sold, and they were all the time buying them and carrying them off. It is simply a question of business policy on the part of the Welsbach people, as to whether they are going to permit their business to be taken away from them by people who undersell them. Certainly the people selling their burners in such large numbers are helping the gas company, because they are putting out incandescent electric lights very rapidly by the substitution of these incandescent gas burners. That is our experience. As to the duration of mantles in these cheaper burners I am not prepared to speak, because they have not been burning there together sufficiently long to enable us to make a comparison with the Welsbach; but I do know that, in a certain place, where I am quite familiar with the amount of gas burned, the mantles have been in use for four or five months and as yet show no deterioration in light giving power. One other point which I think is of interest to the gas industry of New England and of the country at large, is the fact that the Welsbach Company has a very excellent burner for outdoor lighting. Those of us who had the pleasure of visiting their works at Gloucester, at the time of the last Philadelphia meeting of the American Association, saw a fine array of burners between the steamboat pier and their factory, with different styles of lanterns, and we know that they gave a very fine light. It was very gratifying to us to see that exhibition, because of the fact that a large part of our street lighting business had been taken away from us by the electric lighting companies; and these incandescent gas lamps seemed to promise us a sure means of getting back our lost business—for with some of us the street lighting is an important part of our business; at least it was with us. I found, however, that the Welsbach system of doing business was not such that we could successfully introduce their lamps in our city for street lighting, for the reason that they would not sell lanterns, but would only rent them, and at such rates as made their use prohibitory. That was my experience in an endeavor to get some of them for lighting a pleasure ground in Hartford with which I was connected last Summer. Within two or three months a burner on the Welsbach principle has been brought to my attention—an incandescent burner—which I have tested. I have a little plot of ground in which are placed two lamps, one in front of my stable, the other in the yard, at the side entrance to the house; a service-pipe from the house to the stable supplies these two lanterns. An agent brought the burners to me and said that they would burn out of doors. There are no public gas lamps in Hartford, so I said to him, "There is a lamp out at my place, and as I am situated where the ground is above the average level, if there is any wind blowing I am sure to get my share of it. Put the burner on and test it there." It was a square lantern with open bottom, with a long stem going up to very near the top. He put the burner in there, on top of that stem, which carried it altogether too high in the lantern for that burner. For 12 or 13 nights it burned perfectly (it was there through that severe storm of wind, rain and snow), and during all that time I could discover not the slightest variation in light giving power. Owing to the fact that the stem of the small pipe was slightly bent, one side of the mantle, towards the top, had a hole burned in it and gradually the hole increased in size until the efficiency of the mantle was exhausted. But for 12 or 13 nights it burned perfectly in that open-bottomed lantern, and without the slightest variation in the motion of the flame or in its light giving power. I believe if the stem were properly adjusted and a bottom put in the lantern it would burn perfectly. If such is the case, and if we can get that burner (as I think we can) for not exceeding 60 cents, all complete, and it will give us a candle power such as incandescent burners give, for the amount of gas consumed, I think we have made a great step towards solving the problem of incandescent street lighting by gas. It requires no patent lantern; it is an open, square lantern, which can be made in any tin-shop, with the old-fashioned post and the old-fashioned frame. Whether it would be improved by putting in a glass bottom, in a measure regulating the supply of air coming up, I do not know; but any open lantern will work perfectly for the length of time that mantle lasted. I was assured by the manufacturer that the mantles could be duplicated for 23 cents. At that rate we could afford to buy two or three mantles per lamp each year, because of the results obtained. That particular burner has not a reputation as yet on the market, although there are from 150 to 200 of them in use in various places in Hartford. I do not know where they are being made, but it is within an hour's ride, behind a fast horse, from Hartford; and the promise is that they will soon be on the market in large quantities. The manufacturer says he does not know of anybody's claim for a patent upon them, and is confident he is not infringing upon anybody. I think this may be of a good deal of interest to us. I am purposing, in behalf of the Hartford Gas Company, to make a further investigation of that burner or of some other one, in the hope of getting back part of our lost business in street lighting, which has gone to the electric company. I think it can be done with very great advantage to the people, by securing better lighting for the streets, and have it cost less money than is now being paid for street lighting.

The President—I have no doubt many members of the Association would be very much obliged to Mr. Harbison if he would send them a sample of that beautiful new burner.

Mr. Lane—I would like to ask Mr. Eilbeck whether the expected decision to which he refers covers both the mantle and the burner?

Mr. Eilbeck—It covers the mantle.

Mr. Nettleton—Within two weeks, in connection with a number of members, I have been told that the Welsbach Company were "backing" a certain competing burner. The intimation came in such a way that I put more credit in it than I had in previous rumors to the same effect; and it seemed as if it were probably true. I was told by friends of mine that at this agency they had bought mantles with the letter "J" on them. Now, as I understand it, Mr. Eilbeck, whom we have all known for years, states here deliberately that neither the Welsbach Commercial Company, nor the people connected with them, are in any way responsible for that, or for any other burner except the Welsbach. Is that so?

Mr. Eilbeck—I think I have sufficiently explained my meaning.

Mr. Nettleton—Then I would like to say to Mr. Eilbeck that if that is his statement, I believe it implicitly. I would like further to say that my acquaintance with Mr. Eilbeck has led me to believe that his word can be absolutely relied upon. And, as one of the Welsbach agents, I propose to drop the matter entirely. I think we may safely rely on the statement that the Welsbach Company is not back of that burner; it must be some one else. Like all the rest of the gas companies, we would like to see the Welsbach Company lower the prices. It means a great deal with us to have the gas company control the incandescent light business, for we can look after it better than any other class of agents. We are interested in the light that gas gives. Many of the competing mantles are poor; that does not affect the burners to any great extent, but it affects the gas companies. If there is any way possible by which the Welsbach Company can put the business back into the hands of the gas companies I believe they will not only be doing themselves a favor but the gas companies as well.

Mr. Eilbeck—I will simply add this to what I have said, although I am very sure that this is purely a trade matter, and not a proper one for discussion on the floor in this manner. The Welsbach Company considers it is perfectly justified in maintaining a margin of profit in the sale of its goods which shall be a fair return upon the value of its investments in patents. If we have no patents then we are prepared to consider this matter as purely a

commercial one, and to come in competition with others—the market being open—and to offer our goods in competition with other goods, and leave it to our customers to decide whether our goods are sufficiently desirable to warrant the price we ask for them. But we maintain that the market is not yet open—that that time has not yet come; and until it does come we think we are justified in getting a return for our investment in patents, which investment represents a very large sum of money. In any event, and whether we win or lose, as I have already intimated, we propose making certain very decided changes in our business policy, with which changes we are sure our customers generally will be thoroughly well satisfied. I do not think it advisable, nor am I able just now to go into any fuller details. I think I have now practically said all that I care to on this subject.

Mr. Shelton—In moving a vote of thanks to Mr. Gifford (for I assume that the matter has now been practically threshed out) I wish also to include a vote of commiseration, because of the fact that nobody, in all the discussion, has made the slightest reference to anything that Mr. Gifford took the trouble to write upon.

The President—The remark is perhaps very well put, but I may say that at the time Mr. Gifford offered to submit a paper on the results of previous experiments of his, the conversation was such that I feel well assured of his sympathy in the discussion we have had here this afternoon. The question is on the vote of thanks to Mr. Gifford.

Mr. Ramsdell—Before that is put I would like to ask a question. In looking over the figures given by Mr. Gifford I have noticed that some balance, and some do not. I have not had time to work out the odd ones; but taking the even ones, such as five feet, for example in No. 3, the multiplication is not correct. In fact only about one-half of the multiplications are correct. I would ask if there is any reason for that?

The President—It is not very far from correct, is it?

Mr. Ramsdell—They do not vary very much, but some are quite incorrect.

The President—I do not know that any of Mr. Gifford's fellow-members in the Association are responsible for his arithmetic.

Mr. Harbison—In connection with the subject of incandescent lighting, I would like to enquire if any member has had experience with the attempted introduction of incandescent gas lighting in his streets, in place of the electric light, and to what extent, and with what success.

Mr. Mansfield—Through the energy of our President, some two years ago some dozen Welsbach burners were placed in the streets of Salem, Mass. We put the burners in the ordinary square lantern, such as had been used for the old 4-ft. burner, except that the bottom of the lantern was closed, save an opening of about 1½ ins. square, through which the stem of the burner passed. Otherwise the bottom of the lantern was tight. At first there was considerable trouble with broken mantles; but it was not so much the fault of the mantles as that of the mischievous small boys, who climbed up and shook the posts for the sake of seeing the mantles break. Whether the mantles have become stronger, or the small boys have become better natured, I do not know; but I think the President of our Company will bear me out in the statement that we now have very few broken mantles. One mantle I observed for 13 weeks, at the end of which time it did not seem to show any disintegration at all. I must say that of the streets lighted by incandescent burners (whether gas or electric), those which are lighted by the incandescent gas light are twice as brilliant as those which are lighted by the ordinary system of incandescent electric lighting. Our President is here, and perhaps he may be able to speak more fully as to details than I can.

Mr. Harbison—Has it been extended beyond the original lot of eight or ten burners?

Mr. Mansfield—I will state for general information that the number will probably be considerably extended. The city has now had the benefit of about two years' experience—at the expense of the Gas Company—and has given it a most thorough trial. If I understand correctly (if I am wrong, Mr. Hale, our President, will correct me) the system will doubtless be considerably extended during the coming season.

Mr. Hale—I do not know that I can add anything to what Mr. Mansfield has stated, except to say that since we have used the lighthouse chimneys on these street lights there has been a marked decrease in the breakage of mantles. Some of the lights have really been in use for about four years. At first there was quite a breakage of mantles and chimneys, but the lighthouse chimney seems to have remedied that trouble. I think a lamp will not average more than three mantles per year. During the late storm, when the electric lights went out entirely, every one of the 25 incandescent gas lamps burned perfectly.

Mr. Sherman—During the last year we have had in New Haven 200 of the Welsbach lamps furnished by the Welsbach Street Lighting Company. They have given very great satisfaction in our streets, both as to price and as to quality of light.

Mr. Harbison—What kind of lantern are you using?

Mr. Sherman—The style of lantern furnished with the burners by the Welsbach Street Lighting Company.

The President—Mr. Hale, are those your own burners, or are they put on by the Welsbach Street Lighting Company?

Mr. Hale—We put them on.

The President—And the Welsbach Street Lighting Company has nothing to do with them?

Mr. Hale—The lanterns are owned by the city, and we put on the burners.

The President—Can Mr. Shelton tell us anything respecting the spread of Welsbach street lighting throughout the country?

Mr. Shelton—I cannot. I only know about it in a general way. My particular work is not in that channel. Possibly Mr. Eilbeck or Col. Barrows can tell that.

Mr. Eilbeck—As most of the members know, the street lighting business is under the direction of another company. They advise us that they have now under contract for street lighting over 6,000 lamps, located in New York, Boston, Baltimore, Chicago, and many smaller cities. The business is extending very rapidly. The burner which was first tried in the streets did not turn out to be in every way satisfactory; but since the Welsbach Street Lighting Company has had the business under its control it has used an entirely new construction of burner, particularly adapted for street lighting, and it has been eminently successful. The introduction of the Welsbach lamp for street lighting has of course taken time. The results thus far have been exceedingly satisfactory, and it is successful beyond question.

The President—Can we not hear from Mr. Ramsdell on this subject?

Mr. Ramsdell—In one place we have between 85 and 100 lamps which have now been running for about three years. They were put in by ourselves before the Welsbach Street Lighting Company was formed. While we had some trouble with them at first, it was temporary and only such as might reasonably be expected. We have no trouble now, or not any more than we would have with ordinary street lamps. I think it is the finest street lighting I have ever seen. These that I speak of are in a suburb where there is a great deal of foliage, and some of the lamps were set a very wide distance apart, with the expectation of putting in intermediate lamps; but the light has been so satisfactory, even from those lamps which are widely scattered, that we have never put in the intermediate lamps. The Street Lighting Company has just closed a contract for another of our Companies where we are to have, I believe, about 200 lamps. The first I mentioned are right on Long Island Sound, and a number of them are on the old Boston Post Road, right where the wind strikes them, but I do not think the wind has had any effect whatever upon them. The only trouble we have had of any importance has been caused by insects or bugs. We did have some trouble at one time from a small spider that would get into the air tube, or into the Bunsen burner, and spin a web right straight across it. It was quite a little while before we found out what the trouble was and applied a remedy, but since that application we have had no further trouble from them.

Mr. Lamson—We have about 200 lamps in Worcester at the present time, and they are satisfactory.

The President—I believe we are all interested in the Welsbach street lighting business, yet Mr. Allen says in his paper: "Towns like Bradford, England, where 2,500 such lights are installed, like Rome in Italy, like Munich in Germany, present streets lighted very differently than those of American cities supplied with the usual flat-flame 4-foot burner." Beacon street, between Arlington and Berkley, was lighted years ago by Welsbach burners. I do not know why they were taken away. It was a very beautifully lighted street, but for all that the Welsbach burners were supplanted.

Mr. Shelton's motion that a vote of thanks be tendered to Mr. Gifford for his paper was adopted, after which the Association adjourned to Thursday, February 17th, at 10 A.M.

[To be Continued.]

[Continued from page 330.]

ABSTRACT OF PROCEEDINGS, FIFTH ANNUAL MEETING, MICHIGAN GAS ASSOCIATION.

HELD AT HOTEL HARRINGTON, PORT HURON, MICH., FEB. 16 AND 17, 1898.

FIRST DAY—MORNING SESSION.

The President introduced Mr. Frank H. Hess, of Ann Arbor, Mich., who read the following paper on

EXPERIMENTS WITH THE WELSBACH LAMP.

This subject has been chosen because of the fact that so many of the members of the Association are not immediately connected with the

installment and maintenance of Welsbach lamps, but leave this work to underworkmen.

Since the fall of lighting gas consumption, previous to six years since, due to improvements in electric lighting, gas has returned to popularity through the agency of the greatest invention in its history, the Welsbach lamp. It is, however, an agent in our hands which may be detrimental if neglected; but if properly installed and maintained it cannot be equaled by any other form of commercial light, either in efficiency or in the satisfaction given.

Last year we had a comparison given between the Welsbach and Rochester oil lamps, in which it was shown that for 12 cents the best oil lamp gave only 831 candle power hours, while the No. 34 Welsbach gave 3,384 candle power hours, or an increase of 300 per cent.

A more noteworthy comparison may be made between the Welsbach and the incandescent electric lamp. In our city 3.5 watt lamps are used, with voltages of 50 and 110. It is the intention of the electric company to furnish consumers with 16 candle power per hour for ¾ cent. At the rate of 13 cents per 1,000 watts, the consumer receives 276.8 candle power hours for 13 cents. In testing an incandescent the candle power tabulated is the mean of the candle powers determined in the horizontal and vertical plane of the filament; that is to say, readings are taken with the lamp in different positions, and an average of these results recorded as the actual candle power of the lamp.

To make a fair comparison with the Welsbach an average candle power must also be taken with the bar at various angles. In practice we use a shade to arrest the rays passing up from the mantle and reflect them in a direction where they will be of use. However, in comparing the light of a Welsbach with a candle, it is not exact to compare with one direct observation in the horizontal plane, or to take the sum of results in different planes, as the Brush Electric Company originally did, but to take a mean of the candle powers determined at different angles with the horizontal. A rough determination may be made by tilting the bar at various angles and screening the sight boxes and reflecting the candle along the bar with a mirror, of course correcting for mirror reflection. This will give a mean candle power for the Welsbach of about 40, taking reading at angles between 45° above and 45° below the horizontal plane of the mantle. Knowing that the Welsbach consumes .45 cent worth of gas per hour, our consumers receive 1,353.6 candle power hours for 13 cents, or 4.9 times the light received from an incandescent.

There is an excellent article, which you have doubtless read, in the January 10th number of the AMERICAN GAS LIGHT JOURNAL, taken from a publication issued by the General Electric Company. We may glean from this article that, under ideal circumstances, where the voltage is constant and incandescents are renewed every 600 hours, the light deteriorates from 16 to 12.8-candle power, giving an average of 14.4 candle power. A Welsbach, which was used 2,190 hours, showed under test no loss in candle power. Now, upon estimating that one-half cent of the 13 cents per 1,000 watts will cover breakage with a Welsbach, we have a fair comparison for efficiency of 5.2 to 1 in favor of the Welsbach.

It has always been claimed by consumers that incandescents were the best lights for show windows, especially where the inconvenience was so great in lighting gas after the window dressing had been done. We have disproven this idea. A neat fixture may be made by suspending a brass or nickel covered pipe horizontally near the front of the window. Into this may be tapped as many burner cocks as desired, and Welsbachs installed with mirror reflectors or silver reflector shades. With mica chimneys, into which spark points are inserted, and with necessary wiring, battery and induction coil attachments, our merchants can, by opening a main valve and pressing a button, light their windows. The Welsbach thus equipped furnishes a strong, white light, of such quantity and quality that the true color of fabrics and wares is shown as the best arrangement of incandescents has never been able to show them. In our city we have proven this to be true, and have had good success and increase in window lighting.

The only part that remains our duty, since the Welsbach may be used conveniently anywhere, is to perfect the light and give special attention to the finer points of construction and action of the lamp. These must be understood, and watched, if we would cope with our competitors.

The fundamental principles upon which a perfectly burning lamp depend are: Good pressure at the check, proper flow through the check, proper mixing and spreading of the Bunsen flame, and proper suspension of the mantle.

The Bunsen flame should have such a velocity of combustion and should be so perfectly spread that the invisible outer cone of products of combustion should just fit the interior of the mantle. To insure stiffness of flame the fixture must be perfectly clean so that the check does not require reaming. If the initial pressure is so weak that the check requires reaming, the velocity and activity of combustion are less than the velocity of flow through the Bunsen tube, and incomplete combustion or striking back results. For a better explanation of the meaning of comparing the velocity of flow through the Bunsen tube and the velocity of combustion, I would refer you to "Groves and Thorp's Chemical Technology," Vol. III., in which they give a reason for "striking back" in a Bunsen or stove burner. It is not alone due to too much air in the mixer, as we often say, but due also to inactivity of combustion.

The mixture (volume of air and gas) passing through the Bunsen tube should be of such constitution and have such a velocity that the combustion should have maximum activity, otherwise there will be a back pressure in the flame itself, the inner green zone of the flame will be depressed, and, because of this inactivity of combustion, the heat will be transmitted back into the tube until the kindling temperature is reached in the tube or mixer and striking back results. That is to say, the volume and velocity of flow in passing through the Bunsen tube must be less than the volume and activity of the burned gases passing off the flame.

To ream a check where the pressure is poor, in order to get sufficient gas supply, is the greatest error that can be made in manipulating a Welsbach lamp. The result, if good, cannot be depended upon. The Bunsen flame is more sensitive to pressure variation, and the lamp, supposed to be properly adjusted, may be found depositing lampblack the following day. The light flickers and the mantle is endangered from explosions at lighting. A burner governor is not much better, as the above difficulties are not remedied. An adjustable check is best in cases where the Bunsen flame must be made larger, for the stiffness of flame is maintained, and the comparative velocities of supply and activity of combustion, referred to above, are not affected to so marked a degree.

The next gross error to avoid is having too large a Bunsen flame, or an irregular shaped flame. This endangers the life of the mantle. The mantle or any portion of it should never be enveloped by the Bunsen flame. The mantle should be suspended in such a way that it is enveloped in the outer, invisible cone of the flame where the hot gases of complete combustion are passing off.

The chemist divides the Bunsen flame into three zones, namely: The inner hollow zone *A* (Figs. 1 and 2), where combustion has not as

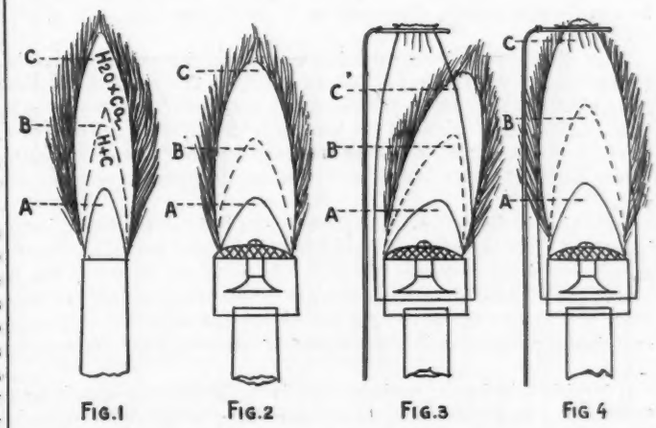

FIG. 1 FIG. 2 FIG. 3 FIG 4

yet begun; the middle zone *B*, where the disassociation of the hydrocarbon takes place, and the outer invisible zone *C*, where the burned gases, CO_2 and water vapor, pass off. If the chemist wishes a reducing flame for deoxidizing a metallic oxide he introduces his blowpipe into the lower part of the middle zone, *B*, above the hollow zone, where the reducing hydrocarbons are yet unburned and where the temperature is high. If he wishes an oxidizing flame he introduces the blowpipe in the apex of the outer zone, *C*, where highly heated CO_2 is passing off and O from the air is abundant, making ideal conditions for oxidation but not for reductions. Because of these facts as to the nature of a Bunsen flame, a mantle should never be enveloped by the middle zone of the flame (as in Fig. 4), neither should this part of the flame be allowed to play on any particular portion of the mantle (as in Fig. 3), for the metallic oxide of the mantle, which at the temperature of a Bunsen burner cannot be fused or decomposed, may be deoxidized

slowly, if subjected to a reducing flame such as the inner zone of a Bunsen flame. To demonstrate this, suspend on a tripod a small piece of broken mantle in the middle zone *B*, of a Bunsen flame. It will slowly wear away as the oxides are reduced and the metals freed.

You have often been troubled with some particular lamp in which the mantle became perforated near the apex and caused the breaking of two or more chimneys. Upon examination you will probably find your Bunsen flame too large (as in Fig. 4) or badly distorted by a corroded or dirty gauze (as in Fig. 3). This deoxidation may also occur with a blackened mantle since we have free carbon as a reducing agent. For this reason a mantle which has once been blackened is always weakened, and often perforated when burned off again.

The gauzes of the No. 20 lamp, or the gauze and spreader in the No. 34 lamp, are very important factors, since their object is twofold. First, they fill the office of regulating the comparative velocities of initial flow and combustion, by holding back the volume of mixed gas and air underneath, and at the same time increase the activity of combustion above by mixing the gas and air still more; second, they shape the flame to the mantle by lowering the inner zones, giving more surface for combustion to the outer zone. This checking of flow with a gauze may be overdone. The gauzes should never be dirty. The meshes of the gauze must be adapted to the gas used and should not better one orifice at the expense of another.

In connection with these theories, experiments with the photometer, to show the loss of light where there are defects in setting up or repairing the lamp, are very practical. These points although less important are of great value in satisfying consumers, and in self satisfaction when comparing the lamps of various consumers.

The ideal Welsbach lamp, with our gas of 18.6-candle power, and at 26-tenths pressure, burns 2.9 cubic feet per hour and gives a candle power of 61.2, readings being taken with the lamp turned at different degrees on the Bunsen tube. By reducing the pressure to 15-tenths, the consumption being regulated to remain the same, the candle power varies slightly, but unsteadiness of light results. From this pressure of 15-tenths to 6-tenths, the limit of complete combustion, the consumption remaining the same, the candle power slowly diminishes from 61.2 to 42. By reducing the consumption as well as pressure, say to a consumption of 1.92 cubic feet and pressure to 15-tenths, the candle power is reduced to 28.6. If the consumption is reduced to 1.5 cubic feet and the pressure to 9-tenths, the candle power is reduced to 12.25.

With a dirty chimney the candle power is reduced from 21 to 33 per cent. If in the No. 20 lamp the gauzes are parallel, so that the mixing is not as complete, the candle power is reduced 11 per cent. With a hole in the upper gauze, the candle power is reduced from 25 to 41 per cent.

With dirty gauzes from corrosion or carbon, the candle power is reduced from 9 to 18 per cent. We see from this that any fault in the lamp results in a reduction of from 9 to 50 per cent. These faults vary from slightly dirty chimneys to a broken gauze. A dirty chimney can be changed. A burned out gauze is not to be found, except in lamps where the consumption is too large, or where the gauze is corroded or dirty.

Following in the path of these experiments is the discussion of lamp insurance. We have reason, from proof, to believe that lamp insurance in our city is a success. It gives the consumer at the outset a knowledge of what his lighting expense for the year is to be. It does away with those eyesores to a gas man—dirty shades, broken chimneys and disengaged mantles in places where our customers are less particular.

It furnishes the best advertisement we have, for one poor lamp is seen further than many good ones. It is an educator, for extra effort is made that ignorance on the consumer's part shall not be at our expense. There can be no dissatisfaction with the consumer as to breakage account, for a contract is made for the year.

The following record of our insurance for 1897 may interest you—we have insured only in business portions of the city, and for the most part where there is the greatest risk:

Average number of lamps insured per month.....	236
Average premiums per lamp per month	11.4 cents.
Mantles used during year	472
Average number of mantles per lamp per year.....	2
Glass chimneys during year.....	215
Other chimneys " "	51
Average number of chimneys per lamp per year....	1.1
Shades used during year.....	10
Cost of labor during year.....	$32.47
Total cost during year on 236 lamps.....	$204.42
Total premiums during year on 236 lamps	323.35
Total gain on 236 lamps.....	$118.93

—or 56 per cent.

From this data the life of a mantle is six months. We have, however, a record (on 2,084 lamps) of 12 months 1 day, as the average life of a mantle.

We have used glass chimneys entirely, except in cases where insects added a great risk. We find that when the lamps are carefully watched and made to burn properly mantles are seldom broken, except when shattered by a sudden jar, in which case the consumer usually informs us immediately and the chimney is saved. Glass chimneys are useless on broken mantles and mica chimneys are not much better, except for the limited time before they are blistered and dirty. When the mantle is worn at the base we lower the support so that an uneven heat cannot play upon the glass. We also find that washed chimneys are better than new ones, because the lead oxide liberated and deposited upon the chimney in a white coating is not as abundant. However, a washed chimney, if washed with water, has suffered some change in temper and is more liable to break.

We are now at the head of lighting agencies. It should be our object to remain there, and do so by perfecting what we already have at hand, and meanwhile keep a lookout for something better.

I have been interested in testing some of the many incandescent gas lights now on the market, and find none equal in construction or efficiency to the Welsbach, as the following will show:

The "Economic Incandescent Gas Light" cannot be adjusted to our gas, since neither the mixer nor check has proper adjustments. Instead of a gauze or spreader there are slits in the sides of the Bunsen tube which protrudes through the frame; thus the mantle is excessively heated at the base but not at the top. The mantle has the side support curved at the top through the asbestos upon which the mantle is gathered. The mantle is very frail and thin, and shrinks and warps badly upon being burned off. The best result obtained was 25.4 candle power, with 3.45 cubic feet, at 24-tenths pressure.

The Apollo is, in principle, constructed very much like the Welsbach, with the exception of an asbestos hanger for the mantle. The mantle is even thinner than in the Economic, the slightest jar sufficing to shatter it. The candle power obtained by reducing the consumption to 3.15 cubic feet per hour is 62.1. The lamp, however, is not for practical use because of the delicacy of the mantle.

The Venus had originally a central support to the mantle, but has since been changed to side support, and resembles the Welsbach in construction. The mantle is stronger than the Apollo, but naturally gives less light with the same consumption. The result of a test with 3.14 cubic feet per hour was 47 candle power. The mixer, gauze and spreader are very good in this lamp, and with a good mantle would give much better results. The check is not changeable. The mantle is suspended from an asbestos cord.

The Daylight lamp has the virtue of being durable, since the mantle is even tougher than the Welsbach mantle. This is the only lamp I have seen, other than the Welsbach, in which the mantle retains its original form when heated. Because of the thickness and strength of the mantle, however, this lamp gives only 44.3 candle power, with 3.33 cubic feet consumption and 24-tenths pressure.

The Improved Standard Lamp gives 54.8-candle power, with 3.3 cubic feet at 46-tenths pressure. This lamp has a poor mixer, has not a changeable check, and is unstable when put together. It has the usual asbestos hanger mantle with side support. The spreader is too small so that the proper shaped flame is not obtained. The mantle is of strong texture, but brittle.

The principle of most lamps copied after the Welsbach is at fault. A lamp is useless that has not proper adjustment. The Economic is impracticable; the Apollo has a removable check, but is too frail for commercial use, as is also the Venus. The Daylight has durability at the expense of efficiency. The Standard requires more care in construction and a stronger mantle. In none of these lamps does the mantle seem to have the elasticity of the Welsbach mantle after having been burned. They are either too frail or too brittle.

We have had a few of these infringements in use in our city, but because of the ignorance of agents handling them they have been broken so frequently, or allowed to burn imperfectly to such an extent, that there are less than a dozen now in use. No doubt you all have in view some business men in your city who do not see the advantages of using the incandescent gas light. The best means of installing Welsbach lamps and adding to our list of consumers is a question to all of us.

First, we may see that customers we already have are satisfied—the best principle for all retailers; but we may further incline a merchant our way by putting in a lamp on trial, if possible, between two 16 candle power incandescent electrics, and give him time to think it over.

It is perfectly safe to install lamps on trial; they are seldom taken out—never except in cases where the fixtures are subject to a jar that cannot be remedied by anti-vibrators. We have many talking points that can be proven.

It has not been my object to go to any extent into the theories of flame temperature, the Bunsen burner, or interior illumination; many excellent articles have been written upon these subjects. For further study in these questions I would refer you to "Groves' and Thorp's Chemical Technology," "Remsen's Chemistry," Vivian B. Lewes' papers, especially the one written for the Exposition in New York last March; Wilhelm Geutsch, on "The Incandescent Gas Light," published in the Gas Journals in October, 1895; and to the papers written by Mr. C. H. Page, Mr. Alten S. Miller and others on interior illumination. Still, enough of the theory of combustion must be understood to be practical in perfecting the Welsbach lamp.

We are all puzzled at times by some particular lamp. After squinting through the gauze to see if it is clean, and after trying the Bunsen to see if we have a proper flame, we relight the lamp to find that something is wrong; for the best results are not obtained. Here is where practice ends and theory begins, and after some work and worry we are able to determine the trouble. The gauze may be dirty, or one hole in the check stopped. It may be the fixture is dirty and the hole in the check too large. It may be the cap holding the gauze is loose.

We are greatly indebted to the Welsbach Commercial Company for the care they have taken in instructing their customers. Certainly, if the public is properly used and our appliances are perfected, we have in efficiency and economy a light that has no competitor.

After a spirited discussion on the paper, which discussion contained many references to and criticisms of several of the incandescent lamps now on the market, the ultimate verdict reached was that the Welsbach lamp was superior to the competing lamps, both in point of quality and results. A vote of thanks was tendered to Mr. Hess, after which the Association adjourned, to reassemble at 2 P.M.

(To be Continued.)

Excerpts from the "Journal fuer Gasbeleuchtung," Etc., of Recent Dates.

A NEW manufactory for carbide of calcium was recently started near Geneva, Switzerland, which seems to be working under exceptionally favorable conditions. The necessary electric current is furnished in the daytime by the water power plant which supplies the city and canton of Geneva with electric light at night. The price paid per horse power per annum ranges from $5.80 to $6.95. Coke of great purity is obtained at a low rate nearby, and the same condition exists as to lime. Labor is very cheap there, as is well known. Having described the plant as most ingeniously devised, in the construction of which advantage was taken of the latest improvements, it is estimated that the cost of a ton of carbide of calcium will be $30.30. This does not include packing for transport.

PETROLEUM has been discovered within the limits of the little city of Vöhl, Province of Oberhessen, Prussia. A Hanoverian Company has leased the oil-bearing locality, and has made a contract according to which 24 cents will be paid into the treasury of the community for each barrel of oil taken. Work on the wells must be commenced not later than July 1st, 1898. This may interfere with the sale of Russian and American petroleum.

AT the Gitchiner Strasse works of the Imperial Continental Gas Association, at Berlin, in October last, 26 benches of 9's, of inclined retorts, which were fired up (having been newly erected the past summer), are described as working very satisfactorily, carbonizing 660 pounds of English coal easily, in five hour charges. Numerous visitors from both native and foreign countries call for inspection, viewing the operations with interest.

ALTHOUGH Mr. Gerdes, Chief Engineer of the Pintsch Company, of Berlin, demonstrated that there was great danger in using acetylene *per se* for railway illumination (see notes in AMERICAN GAS LIGHT JOURNAL, page 407, Vol. LXVII.), he found that if the acetylene were mixed with oil gas it could be used with perfect safety, provided the mixture does not contain to exceed 50 per cent. of the former. It was found further that a mixture of 25 per cent. of acetylene and 75 per cent. of oil gas gave the most economical results. When more than 25 per cent. of the acetylene was mixed with the oil gas the increase in illuminating power was not in favorable proportion to the per cent. of acetylene used. The result of the discovery is, in the first place, that the Minister of Public Works, of Prussia, has ordered the Prussian State Railways equipped with the system, and has recommended that the acetylene factory at the Gruenewald Railway Station be taken as a model for future installations. At the present time, about 123,599,000 cubic feet of oil gas are used annually to light trains; and it is expected that the carbide consumption will reach about 3,000 tons per annum.

THE gas motor railway seems to be progressing steadily, if slowly. The "Gas Traction Company" of London, have furnished some of their gas cars for the "Compagnie Générale des Omnibus" at Paris, France. The car seats 42 persons. The weight of the cars is not more than one-half that of trolley cars used, and less than one-half that of cars, the motor power for which is compressed air.

At Dessau also the gas tramway is steadily growing in favor, especially since the Dessau Company has introduced a number of desirable improvements. The cost of operation and maintenance of plant of the gas motor street railway is said to be not one-third of that of any other system for moving cars.

On Some New Compounds of the Cerite Metals.

By M. ANDRE JOB, in *Comptes Rendus*.

The oxalates of the cerite metals are soluble in warm concentrated hydrochloric acid. If we let the solution cool slowly to the ordinary temperature, we notice that fairly large, well defined crystals are deposited. They differ completely in their composition from the original oxalate. In fact, if we calcine them at a red heat and dissolve the residue from the calcination in nitric acid we can perceive the odor of chlorine.

Having made these observations, I was desirous of studying more closely the compound which was formed, and I took the salt of lanthanum as my first subject for analysis. According to my experience the constant composition of the crystals of the oxalochloride is shown by the following formula: $(C_2O_4)_3Cl_3La_2+5H_2O$.

We can see that it is an oxalate where 1 molecule of oxalic acid has been displaced by 2 molecules of hydrochloric acid. Boiling water decomposes this oxalochloride into insoluble oxalate and soluble chloride:

$$3[(C_2O_4)_2Cl_2La_2]=2[(C_2O_4)_3La_2]+La_2Cl_6.$$

The crystals obtained as above were kept for several hours at 120° without undergoing any decomposition. At 230° they lose their water of crystallization. We note the loss of weight. We dissolve in cold nitric acid and precipitate the solution with nitrate of silver, and thus estimate the chlorine. I assured myself that concentrated nitric acid drives off all the chlorine on boiling, and that on evaporating and calcining we obtain a residue of oxide; in this manner I estimated the lanthanum. Finally, I estimated the oxalic acid in the cold in nitric solution, and, in spite of the presence of hydrochloric acid, by means of an oxidizing solution of cerium. I shall shortly describe this new method of analysis.

The analysis of this compound does not require the lanthanum to be absolutely free from cerium and didymium. Still I purified the sulphate used as a starting point with great care. The spectroscope, even, did not show the presence of didymium. I also proved the absence of cerium, for which I have found a new and very sensitive reagent; the salts of the cerite metals are nearly all very soluble in a concentrated solution of neutral carbonate of potassium. One drop of peroxide of hydrogen shows the presence of cerium by an intense red coloration if it is present in any notable quantity, and by as distinct a yellow color even if the solution is diluted down to 1 part in 250,000.

After having analyzed the oxalochloride of lanthanum, I prepared the analagous compounds of cerium and didymium, and made the analyses. I also decided that oxalobromides and oxaloiodides exist. The oxalochlorides of the cerite metals possess one very interesting property; the oxalochloride of lanthanum calcined at a red heat does not lose its chlorine, and the composition of the residue is similar to that of the original oxalochloride, $La_2O_2Cl_2$. Thus we have a convenient method for the easy preparation of the oxalochlorides of these metals.

There is an opportunity to study, from the point of view of chemical

equilibrium, the formation of the oxalochlorides in dilute hydrochloric solution. I have observed that the oxalates precipitated from a hydrochloric solution, even when dilute, still retain a considerable quantity of oxalochloride; and thus it may be explained that different chemists, in calcining the oxalates and the sulphates, have constantly found different atomic weights. It remains to be seen if, in starting with oxalochloride itself, we cannot manage to obtain concordant results. I would here recall the fact that Clève prepared an oxalonitrate of didymium, and that Wyrouboff and Verneuil have notified the presence of oxalonitrite of cerium in the oxalate crystallized from a concentrated nitric solution.

I would finally add that Souchay and Leusenn have prepared an oxalochloride of calcium. Calcium presents, in the same manner as the cerite metals, this common property, that its oxalate is insoluble in dilute acids. I am following up the research on the metals whose oxalates are soluble; this will be the subject of another communication.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. J. J. HUMPHREYS, JR., Superintendent of Works, Worcester (Mass.) Gas Light Company, writing under date of February 28th, informs us that he was misreported at one point in his share of the discussion, on the paper on "Gasholder Construction," by Mr. H. A. Allyn, of Cambridge, Mass. In the report printed in the JOURNAL (Feb. 28, p. 327, seventh paragraph) Mr. Humphreys is recorded as having said: "By a number of tests made some time ago of brick and cement I ascertained that the Rosendale cement gave 920 and the Portland gave 960." What Mr. Humphreys did say was: "By a number of tests of German Portland and Rosendale cement briquettes, the Rosendale gave about 570 pounds tensile strength, and the German Portland 960 pounds."

MR. W. E. FETTE informs us that his presence at the hearing before the Board of Gas and Electric Light Commissioners, in the matter of the petition of the new proprietors of the Dedham and Hyde Park (Mass.) Gas and Electric Company for the right to increase their capital stock in the sum of $60,000, was occasioned through curiosity. The JOURNAL, for February 14th, stated that Mr. Fette was one of those who appeared for the petitioners.

AT the annual meeting of the shareholders of the Butte (Montana) Gas Light and Coke Company the following Trustees were elected: A. W. Von Utassy, W. H. Hopper, A. D. Hopper and H. L. Frank. At a subsequent meeting of the Trustees the following executive management was perfected: President, A. D. Hopper; Vice-President, A. W. Von Utassy; Treasurer, A. J. Davis; Secretary, R. S. Feurtado. It is the intention of the management to carry out considerable improvements in the line of main extensions this summer. During the past year a new bench of 5's was installed, as well as a Mitchell semi-regenerative bench of 6's. This latter has given entire satisfaction, and with it, together with two benches of 5's, the Company expects to finish out the year without any further expenditure on generating account.

DURING February the following shipments of the Anderson Pipe Cutter and Pipe Vise were made: Six No. 1; two No. 2 and one No. 3 cutters to the United Gas Improvement Company, Phila., Pa.; one No. 1 cutter to the New Orleans (La.) Gas Light Company; and one No. 1 cutter to the Capital City Gas Company, Des Moines, Iowa.

AT the annual meeting of the shareholders in the Charleston (West Va.) Gas and Electric Light Company, the Directors chosen were: Ph. Frankenberger, P. G. Walker, O. H. Michaelson, F. Woodman, J. W. M. Appleton, E. W. Knight and W. S. Laidley.

ARTICLES incorporating the Oklahoma Construction Company, of Blackwell, Oklahoma Territory, have been issued. The purpose of the Company is to construct railroads, electric light and gas works, water works and telegraph and telephone lines. The Directors are: J. L. White, W. P. Hardwick, Ed. L. Peckham, C. J. Peckham, of Blackwell; and D. E. Trim, of Guthrie, O. T.

THE following ordinance, adopted last month by the San Francisco Board of Supervisors, explains itself:

"The people of the City and County of San Francisco do ordain as follows:

"Section 1. The proprietor, lessee or person having charge or control of any hotel, boarding or lodging house, whenever the supply of gas is stopped off at any gas meter for the purpose of regulating the use of gas, or for any other cause, shall not turn on the gas or allow gas to flow in or through said gas pipes in said hotel, boarding or lodging house, until the gas keys of all gas fixtures in said hotel, boarding or lodging house are first examined and found to be shut off to prevent the escape of gas.

"Sec. 2. It is hereby made the duty of the proprietor, lessee or person having charge or control of a hotel, boarding or lodging house, to have a printed notice, containing the words 'Do not blow out the gas,' suspended from or placed under all gas fixtures erected or used in said hotel, boarding or lodging house. The letters of said printed notice provided for, to be not less than one-half inch in height.

"Sec. 3. Any person violating the provisions of this order shall be deemed guilty of a misdemeanor, and on conviction shall be punished by a fine of not less than $20 nor more than $100, or by imprisonment not less than 5 days nor more than 30 days, or by both such fine and imprisonment.

"And the Clerk is hereby directed to advertise this order as required by law."

MR. PAUL DOTY has resigned the position of General Manager of the Consolidated Gas Company, of New Jersey, to accept the much more respossible position of General Manager of the Grand Rapids (Mich.) Gas Light Company, replacing there Mr. H. D. Walbridge, who takes charge of the reorganized Detroit Company this month.

MR. WILLIAM B. BUCKMINSTER has been elected President of the Malden and Melrose (Mass.) Gas Light Company, vice Mr. Geoge W. Walker, resigned.

THE plants and franchises of the Grass Valley (Cal.) Gas and Electric Light Company have been purchased by Mr. R. R. Colgate, for the ultimate account of the Nevada County Power Company, which concern has been furnishing electric light and power currents in Grass Valley for some time.

THE following is from the Philadelphia *Evening Telegraph*, dated February 25th: "Mr. William K. Park, the former Chief of the Bureau of Gas, has submitted his report to Director Thompson, of the operations of the Bureau during the first 11 months of last year, the plant having been leased to the United Gas Improvement Company on the 1st of last December. This is the 63d report in the history of the works, and states that the yield of gas was 4.79 cubic feet to the pound of coal carbonized, while the candle power was 19.09. During the 11 months the gas manufactured was 4,777,310,000 cubic feet, of which quantity 3,033,153,000 cubic feet are to be credited to the coal gas plants, and 1,744,157,000 cubic feet to the water gas plant at the 25th ward works, making the total quantity of gas made since the erection of the works 89,881,401,000 cubic feet. The coal gas product of the year was divided among the several works as follows:

Works.	Cubic Feet.
Ninth ward	929,797,000
Twenty-fifth ward	351,799,000
Point Breeze	1,751,557,000
	3,033,153,000
Twenty-fifth ward, water gas	1,744,157,000
Total	4,777,310,000

The daily average production was 14,303,323 cubic feet, against 13,424,756 cubic feet in 1896. The largest make in any one day was 18,934,000 cubic feet, on January 28th, and the greatest 24-hour consumption was on November 29th, when it reached 19,440,000 cubic feet. During the 11 months there were carbonized 316,173½ tons of coal, leaving an estimated stock of coal on hand, when the lease went into effect, of 56,263 tons, 201 pounds. Of the quantity of gas manufactured during that period, 2,723,360,600 cubic feet were delivered to private consumers; 787,301,850 cubic feet, delivered to consumers, but not paid for, and in holders; and 633,410,927 cubic feet were delivered to the various city departments, for which no charge was made. The quantity of gas unaccounted-for, leakage, etc., was 1,390,946,273 cubic feet; the stock on hand December 1st, less stock delivered and not paid for, was 787,387,850 cubic feet. The whole number of consumers on the books of the Bureau was 174,791, and the entire length of pipe at present in the streets is 1,278 miles. The gross profits of the works, during the first 11 months of the past year, amounted to $382,646.12. The operations of the year included the finishing of the 3,000,000 cubic

foot holder of the Point Breeze works, the erection of a patent 4-cylinder engine, and the erection of retort house, No. 1, at the 25th ward works. The total amount of gas manufactured in 1896 was 5,568,535,900 cubic feet, while in 11 months of 1897 the total output was 5,564,697,852, which is only 3,838,048 cubic feet less, and in the face of the fact that the consumption in December is larger than during any other month of the year. Another significant fact is shown in the report in the matter of gross profits, which amounted in 1896 to $352,988.80, while for the 11 months of 1897 they reached $382,646.12."

MR. JOHN CORBETT, at one time prominent in the management of the old Chicago Gas Light and Coke Company, died at his home in Evanston, Ills., on the evening of February 25. Deceased, who was born in Belfast, Ireland, in 1823, came to America in 1847, settling in Chicago, where he amassed a fortune, retiring from active business in 1883. He was a prominent member of the third Presbyterian Church, of Chicago. Two sons and four daughters survive him.

THE foreclosure proceedings in connection with the properties of the Hillsdale (Mich.) Gas Company have been to all intent and purpose completed.

MR. JOHN W. JAMES, who was concerned in the founding of the Chattanooga (Tenn.) Gas Company, died at his home in Chattanooga on the evening of February 21st. He was noted for his connection with the construction of railroads in Tennessee; the Chattanooga Southern Railway, the Chattanooga Union Railway and the broad gauge road up Lookout Mountain having been built by him. He served one term as Mayor of Chattanooga.

THE Minneapolis (Minn.) Gas Light Company has issued a very handsome "Handbook for Gas Consumers" for the current year. Its text is without technicality, and its typographical arrangement, as to composition, illustration, paper, presswork and binding, is takingly artistic.

THE Committee on Manufactures, of the Massachusetts Legislature, reported adversely the bill introduced by Mr. Baldwin, of Boston, fixing 75 cents per 1,000 cubic feet as the maximum rate that might be charged for gas sold in the city of Boston.

THE Scranton (Pa.) Gas and Water Company, through its Secretary, Mr. G. B. Hand, has again called the attention of the residents of Scranton to the proposed reduction in gas rates, which reduction was formulated some time ago. The official notification is as follows: "The Scranton Gas and Water Company, and the Hyde Park Gas Company.—In accordance with the policy of these Companies, to reduce rates from time to time as may be warranted by increased consumption, notice is hereby given that on and after April 1st, next, the price of gas will be $1.15 per 1,000 cubic feet consumed, subject to the following discounts: 5 cents per 1,000 cubic feet on all bills where the consumption for the month amounts to less than $25; 10 cents per 1,000 cubic feet on all bills where the consumption for the month amounts to $25 and upwards—provided the bill is paid on or before the 20th day of the month in which the bill is presented. By order of the Board, G. B. HAND, Secretary."

THE plant of the Goshen (N. Y.) Gas Light Company was sold at auction on the 23d of February, by Mr. Horatio Stewart, trustee under the mortgage. The purchaser was A. Vanderwerken, of Brooklyn, N. Y., at his bid of $10,000.

AT the annual meeting of the Canandaigua (N. Y.) Gas Light Company the following officers were elected: Directors, Alexander Grieve, H. M. Field, E. O. McNair, Thos. H. Fearey, F. B. Root, H. B. Ferguson and J. H. Pardee; President, Thos. H. Fearey; Secretary, Treasurer and General Manager, H. B. Ferguson.

MR. JOSEPH F. FRAZER, City Clerk of Lawrenceburg, Ind., announces that he will receive sealed bids up to 7 P.M., April 4th, 1898, for the lighting of the streets of the city of Lawrenceburg, Dearborn county, Ind., either by gas or electricity, for a term of 5 years. The Council reserves the right to reject any and all bids.

EARLY in January last a prominent physician, resident in a busy Eastern city, not 200 miles from Boston, received his gas bill, and an auditing thereof moved him to wrath, and while the latter was still hot he indited a letter to the Treasurer of the Gas Company, the wording whereof was a severe indictment of the Company. The Treasurer having perused the letter penned the following in reply:

"Dear Doctor: Your note of this morning relative to your gas bill has been duly received. While the Almighty has not endowed me with power to regulate all the affairs of this planet, or to right all the wrongs I find, yet, when I meet a troubled soul—one that feels a keen sense of wrong having been done him—my heart instantly bounds with sympathy, and I feel a powerful incentive to try and alleviate, if not relieve entirely, the cause of the wrong, so that his soul, and his house, too, may be illuminated, and that he may rest in the happy consciousness that *he knows* gas is the greatest luxury known to civilization. And more, that there is no other article sold in the market, where similar accuracy has been attained in its measurement, and such little liability to undiscovered error as in the measurement of gas.

"Now, my dear Doctor, this is a very delicate subject for me to touch upon, for it involves one's private affairs. We are often called upon to explain a person's gas bill. For instance; take the one in question. 'For my life,' I cannot give you the A B C of an explanation from your standpoint, for I was never in your house in my life. I don't know whether you use one burner or 20, or whether they burn 5 feet an hour or 10, or whether you extinguish them at 9, 10 or 12 o'clock, or whether you furnish gas to the rooms of your servants or not; or, if you do, whether they are economical in the use of gas or not. In fact, I don't know anything about it; consequently, how can I explain. But I do promise you solemnly that if I should come to your house and board with you, one, two, or three months, I will give you a full and detailed explanation that shall satisfy you the amount is correct or incorrect, and will put myself under satisfactory bonds to pay a year's bill for gas if I fail. You cannot fail to see that I cannot tell why you use 12,300 cubic feet of gas any more than I or your grocer can tell why you use a barrel of flour, or a barrel of potatoes, or a quarter of beef, or a barrel of molasses in a certain length of time. Again, we are not supposed to exercise any control of affairs, even of the use of gas in your house. If I should come up to your house and say to you that you are using too large burners and too many of them, that you could be more economical in the use of gas and so in a few years save money enough to purchase quite a respectable amount of the * * * * * * Gas Company's stock and secure the benefit of the fabulous dividends it pays, why, you would be quite likely to politely inform me that you run that institution, and if I had anything to take up my time to any advantage, it would be wisdom to turn my attention to it. Again, Doctor, I must say (I hope you will excuse me) that I do not like the last clause of your note 'I must submit,' especially in that connection. Now, if you will but just pause and think of it for a moment, you will find that it is entirely wrong, for we are the parties that must submit always.

"We place a meter in your house, with a stop to turn as little or as much as you please. If you choose to get on with one burner only we must submit. If you choose to light up every room in the house, and, as one consumer said, 'Make night the pleasantest part of the day,' we must submit. If you choose to use burners that consume 2 feet per hour—and most people think they want 5, 6 or 8 feet per hour—we must submit; but if you wish to do without it altogether and use kerosene oil, we must submit. Doctor, as writing is too long a story, I will come up and see you the first opportunity and tell you the rest, and so give you a chance, too. Yours very truly, ** ******, Treasurer."

THE Supreme Court of Pennsylvania has rendered a decision, in the case of Joel J. Baily and others, who appealed from a lower court decision, affirming the validity of the lease, by the city of Philadelphia, of the municipal gas works to the United Gas Improvement Company. The Supreme Court found at all points for the city and the Company as against the appellants. The opinion, which is an exceedingly interesting one, was handed down by Mr. Justice Mitchell.

THE executive management of the reorganized Detroit Gas Company it is said will be about as follows: President, Emerson McMillin; Secretary, Philip Cross; Treasurer and General Manager, Henry D. Walbridge.

THERE is no likelihood that the State House measure, proposing gas of 25-candle power, at a maximum rate of $1 per 1,000, for Fall River, Mass., will become a law.

THE Supreme Court has ordered a sale of the properties of the Medina (N.Y.) Gas and Electric Light Company, under foreclosure proceedings instituted by the Holland Trust Company.

THE AMERICAN GAS LIGHT JOURNAL

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MONDAY, MARCH 7, 1898.

The Market for Gas Securities.

The market for city gas shares was fairly active during the week, and quotations were at figures something in advance of those last reported. Strength was particularly shown in the instance of Mutual, which went to 330 bid, holders asking 340 for it. Consolidated advanced to 184½, ex-dividend of 2 per cent., payable the 15th inst. The bookkeepers of the Company, in the nominal annual report of its standing for last year, admit that the Company's assets amount to $45,646,639, against which must be debited an issu d capital of $36,230,000, and "debts" aggregating $3,316,796. The Company is about to construct two large holders, presumably at the old New York station. As has been said by us some time ago, the Legislature sensibly means not to interfere with the operation of the graded bill, and the relations between the local Companies continue in line with harmony. The Standard Company's issues are neglected, but the prices thereof show no change from a week ago, and the same report may be accepted as accurate in respect of New York and East River. Brooklyn Union shows but little recovery from the extremely low prices recently made in it.

In out of-town shares, Peoples gas, of Chicago, opened to-day (Friday) at 93 to 93⅛, and Consolidated, of Baltimore, is quoted at 55½ to 56. Bay State is utterly neglected, the opening to day having been made at 3⅛ to 3½. Western, of Milwaukee, is in good demand at 83 to 84, and it is quite on the cards that it will go to 90 before June 1st. Laclede common advanced sharply from 40 to 43, the preferred remaining quiet, at 90 to 92. The scheme for the reorganization of the Pittsburgh gas properties is making good and satisfactory headway; in fact, all that remains now is the formal indorsement of the shareholders, which is to all intent already secured. United Gas Improvement Company shares sold as high as 233. The Company proposes to increase its capital stock from $11,500,000 to $15,000,000. On the 2nd inst. Attorney-General Knowlton, of Massachusetts, handed down an opinion to the effect that the $1,000,000 of stock put out by the Massachusetts Pipe Line Gas Company was not legally issued, in that the Company had not secured the sanction of the Board of Gas and Electric Light Commissioners for such issue.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

MARCH 7.

☞ All communications will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$36,230,000	100	182	183
Central	500,000	50		..
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	220	230
Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	330	340
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	..
Northern	150,000	50	..	
" Bonds	150,000	1,000	..	
New York and East River	5,000,000	100	81	83
Preferred	2,000,000	100	112	115
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	105	106⅛
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	135	141
Preferred	5,000,000	100	155	161
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	115
Yonkers	299,650	50	130	.
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	116⅛	117⅛
" " Bonds (5's)	15 000,000	1,000	113¾	..
Bay State	50,000,000	50	3⅛	3½
" Income Bonds	2,000,000	1,000	..	75
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	..	90½
2d " " "	3,000,000	1,000	72	75
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,069,000	.	89	91
1st Mortgage	1,085,000	..	101	103½
Consumers. Jersey City	2,000,000	100	78	83
" Bonds	600,000	1,000	102½	105
Cincinnati G. & C. Co.	8,500,000	100	203¾	204
Consumers, Toronto	1,600,000	50	184⅛	187
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	11,000,000	100	55½	56
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Consolidated G. & E. Co.'s, Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit	4,000,000		59	61
" Con. Bonds	4,312,000	..	100	..
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	82	84
" Bonds	2,000,000	..	87	90
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	115	125
" Bonds, 6's	2 650,000	..	106	107
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind	1,000,000	100	90	91
Bonds	1,000,000	1,000	89	92
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	43	43¼
Preferred	2,500,000	100	90	92
Bonds	9,084,400	1,000	103	103¼
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.	1,000,000	..	200	220
Bonds, 6's	4,000,000	..	128	130x
New Haven	1,000,000	25	252	..
Oakland, Cal.	2,000,000	..	53½	54
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	93	93⅛
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100.00	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	88	..
Consolidated 5's	2,000,000		87½	90
San Francisco, Cal.	10.000,000	100	94	94¼
St. Paul Gas Light Co	1,500,000	100	49	51
1st Mortgage 6's	650,000	..	84	87
Extension, 6's	600,000	..	..	..
General Mortgage, 5's	2,400,000	.	88	90
Syracuse, N. Y.	2,500.000	25	17	20
Bonds	1,000 000		94	97
Washington, D. C	2,000,000	20	250	
Western, Milwaukee	4,000,000	100	83	84
Bonds, 5's	3,556,000	.	103	104
Wilmington, Del.	550,000	50	200	

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DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY,
40 WALL ST., NEW YORK CITY, Feb. 10, 1898.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable Mar. 10, 1898, to stockholders of record at the close of business Feb. 28, 1898. Transfer books of the preferred stock will be closed from Mar. 1 to Mar. 10, 1898, both inclusive. Checks will be mailed

1185-3 EDWARD C. LEE, Treasurer.

WANTED,

A Man who has had Experience and is Fully Qualified to Lay Gas Mains.

First-class references will be required.

1185-tf Address "C. H. F.," care this Journal.

Position Wanted

As Superintendent of a Gas Works or a Gas and Water Works

by a man who has had 15 years' experience in building and managing gas works. Is a graduate of the University of Pennsylvania, from Civil Engineering division.

1185-tf Address "C.," care this Journal.

PROPOSALS

FOR

Lighting Streets,

Village of White Plains, N.Y.

Notice is hereby given that the Board of Trustees of the Village of White Plains, N.Y., will, until

TUESDAY, MARCH 22, 1898,

Receive sealed bids for lighting the streets of said village for a term of three years, from November 1st, 1898, upon the following propositions:

First Proposition.—To furnish 75 arc electric lights of 1,200 candle power each, and 100 gas lights of 20 candle power each. All night lighting.

Second Proposition.—To furnish 50 arc electric lights of 1,200 candle power each, and 160 incandescent electric lights of 20 candle power each. All night lighting.

Third Proposition.—To furnish 400 gas lights of 20 candle power each. All night lighting.

Fourth Proposition.—To furnish 400 incandescent electric lights of 20 candle power each. All night lighting.

The bids to state the price per light per year for which lights will be furnished. The Board of Trustees to have the privilege of ordering additional lights of either kind at the contract price per year.

Proposals to be received by the Village Clerk.

Dated White Plains, Feb. 14, 1898.

By order of the Board of Trustees.

S. C. MILLER,
President.

W. B. SUTHERLAND,
Village Clerk.

CALIFORNIA GAS INVESTMENT.

The undersigned will be pleased to hear from parties desiring to invest, or engage personally, in the gas business in one of the most rapidly growing cities in Southern California. The Company owns its own supply of gas-making materials, whereby larger profits are assured than can be made in any other locality in the United States. Address for particulars

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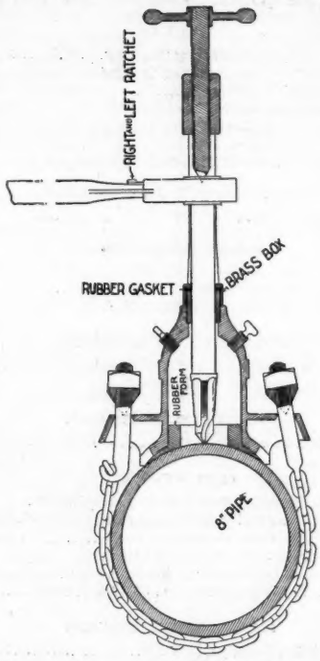

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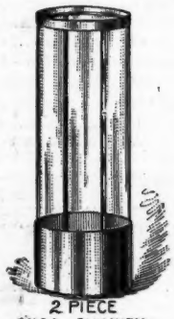

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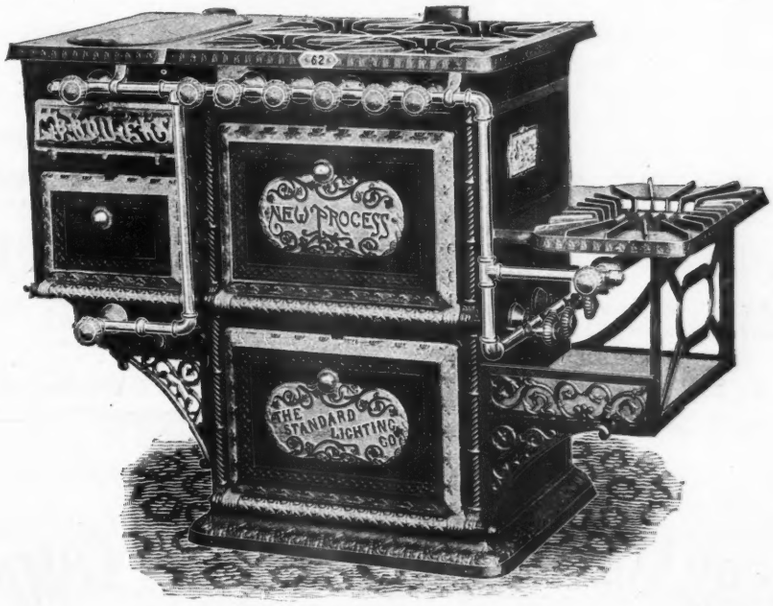

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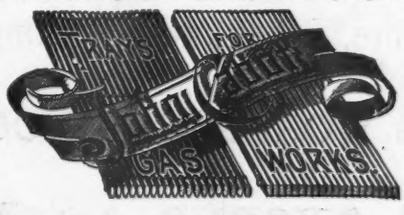

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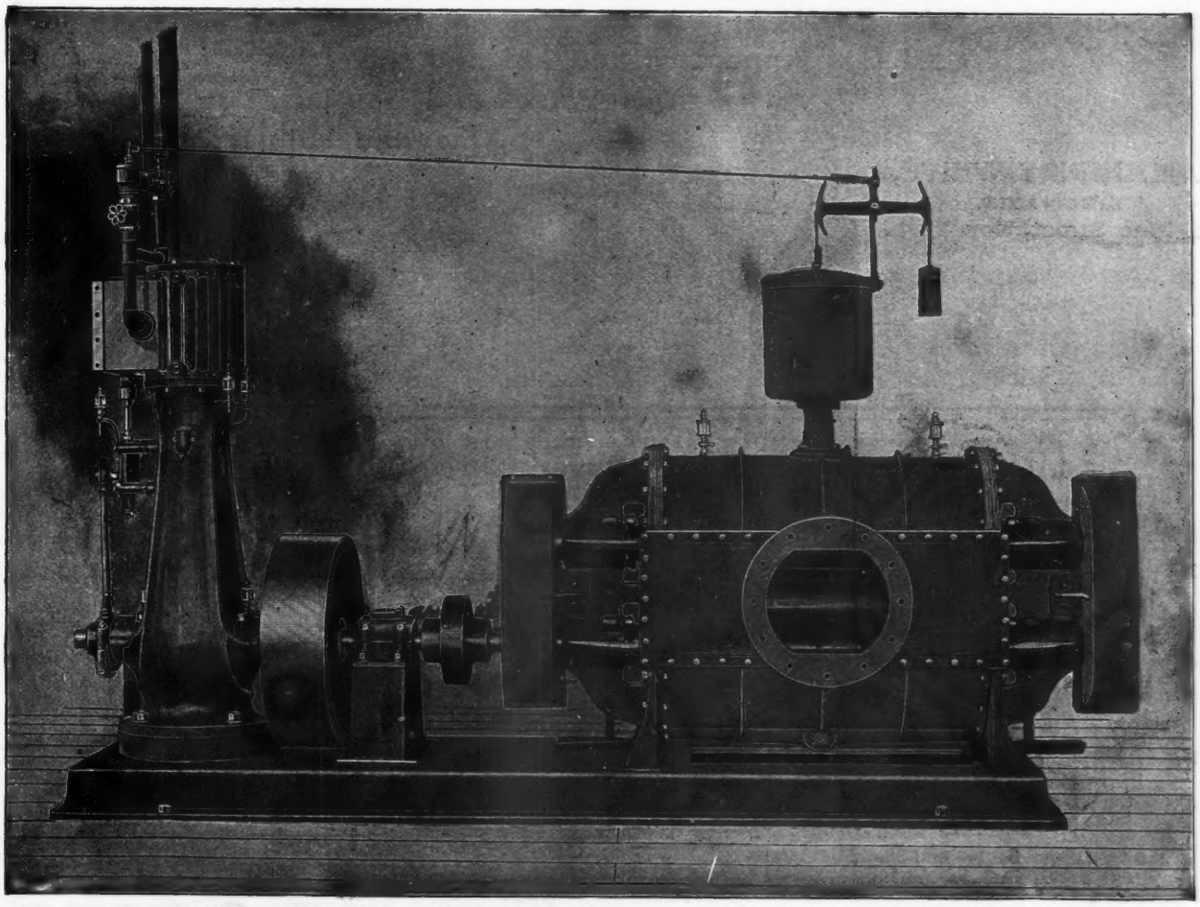

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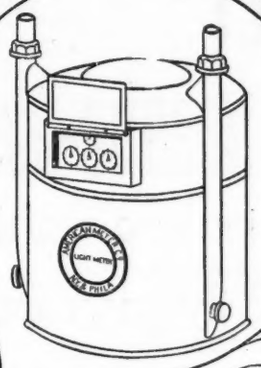
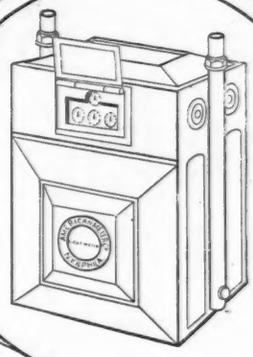
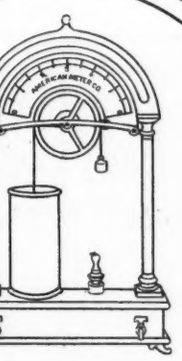


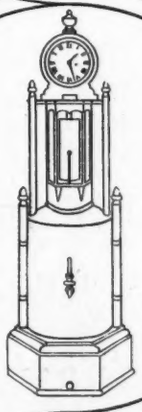


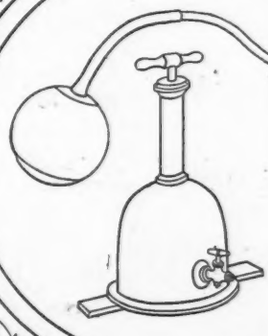
PUBLIC LIGHTING TABLE.

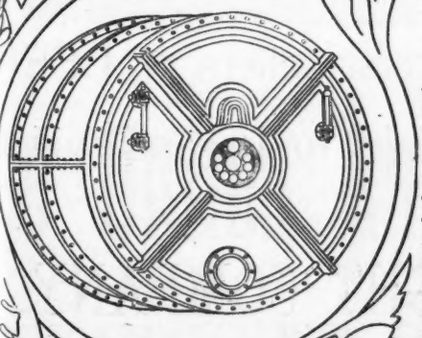
MARCH, 1898.

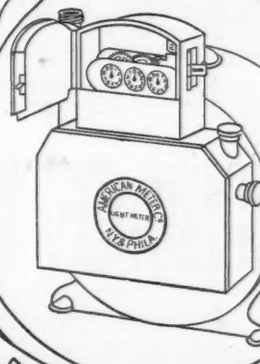
Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Tue.	1	2.00 AM	5.30 AM	5.30	5.45
Wed.	2	2.40	5.30	5.30	5.45
Thu.	3	3.20	5.30	5.30	5.45
Fri.	4	3.50	5.30	5.30	5.45
Sat.	5	4.20	5.30	5.40	5.35
Sun.	6	No L.	No L.	5.40	5.35
Mon.	7	No L. FM	No L.	5.40	5.35
Tue.	8	No L.	No L.	5.40	5.35
Wed.	9	6.30 PM	8.50 PM	5.40	5.35
Thu.	10	6.30	10.00	5.40	5.35
Fri.	11	6.30	11.10	5.40	5.35
Sat.	12	6.30	12.20 AM	5.50	5.20
Sun.	13	6.40	1.30	5.50	5.20
Mon.	14	6.40 LQ	2.40	5.50	5.20
Tue.	15	6.40	3.30	5.50	5.20
Wed.	16	6.40	4.20	5.50	5.20
Thu.	17	6.40	5.00	5.50	5.20
Fri.	18	6.40	5.00	5.50	5.20
Sat.	19	6.40	5.00	6.00	5.10
Sun.	20	6.50	5.00	6.00	5.10
Mon.	21	6.50 NM	5.00	6.00	5.10
Tue.	22	6.50	5.00	6.00	5.10
Wed.	23	6.50	5.00	6.00	5.10
Thu.	24	6.50	5.00	6.00	5.10
Fri.	25	6.50	5.00	6.00	5.10
Sat.	26	10.10	5.00	6.10	4.55
Sun.	27	11.00	4.50	6.10	4.55
Mon.	28	11.50	4.50	6.10	4.55
Tue.	29	12.40 AM FQ	4.50	6.10	4.55
Wed.	30	1.20	4.50	6.10	4.55
Thu.	31	1.50	4.50	6.10	4.55











TOTAL HOURS LIGHTING DURING 1898.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	210.40	January	423.20
February	186.40	February	355.25
March	181.20	March	355.35
April	166.10	April	298.50
May	156.40	May	264.50
June	144.30	June	234.25
July	147.30	July	243.45
August	157.10	August	280.25
September	169.50	September	321.15
October	186.00	October	374.30
November	204.30	November	401.40
December	218.30	December	433.45
Total, yr.	2129.30	Total, yr.	3987.45

$500.00 Reward!

THE PUBLIC IS CAUTIONED that imitation and worthless incandescent burners and mantles are being sold by unscrupulous dealers on the representation that they are the genuine "Welsbach."

THE WELSBACH LIGHT COMPANY will pay $500.00 reward for the arrest and conviction of any person representing and selling incandescent burners or mantles as genuine "Welsbachs" that do not bear our trade-mark.

All genuine Welsbach lights have stamped on the brass work "Welsbach System, Patented," and all genuine Welsbach mantles are branded with our trade-mark, "J," and both burners and mantles are sold in boxes bearing our trade name, "Welsbach."

All other incandescent gas lamps and mantles are infringements of this Company's patents, notwithstanding representations to the contrary, and all manufacturers, sellers or USERS of infringing burners or mantles are liable to be and will be prosecuted

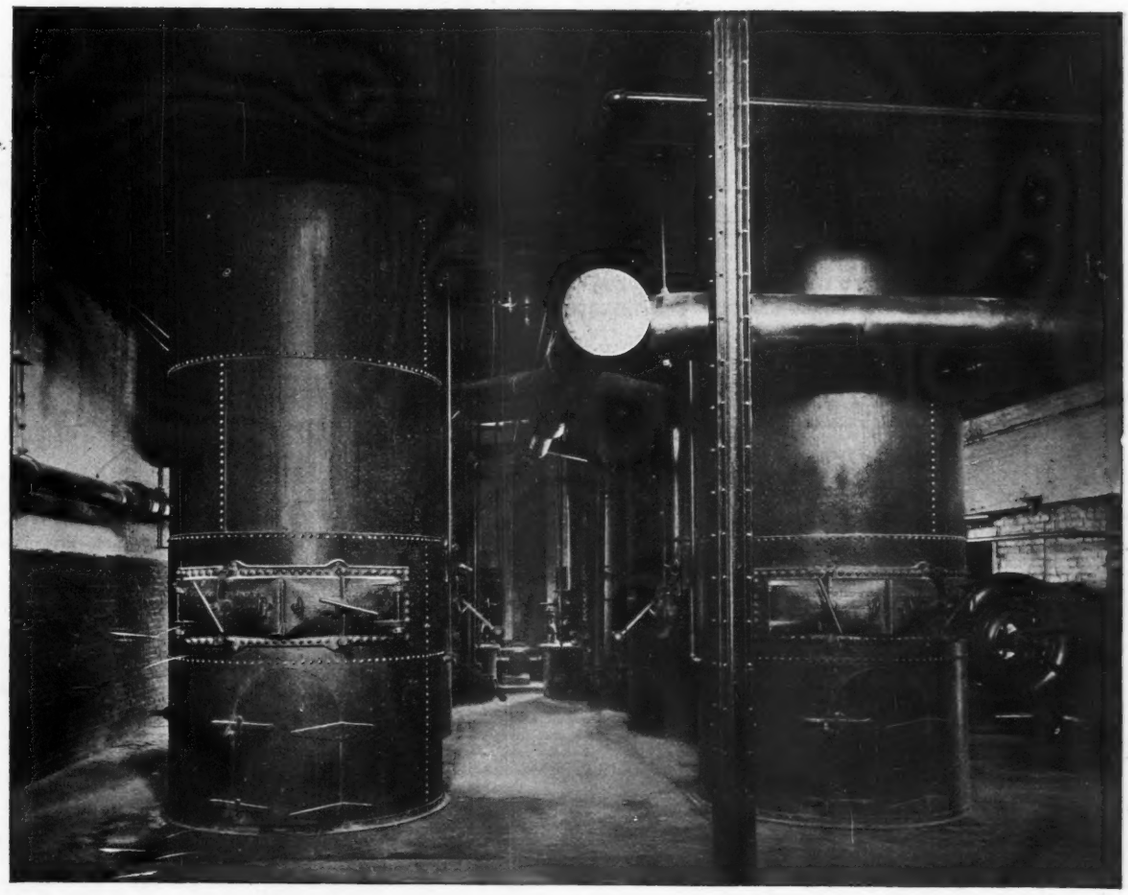
WELSBACH LIGHT COMPANY.

STANDARD

DOUBLE-SUPERHEATER LOWE WATER GAS APPARATUS.

Number of Installations to Date, - - 244

Total Daily Capacity, 131,825,000 Cu. Ft.



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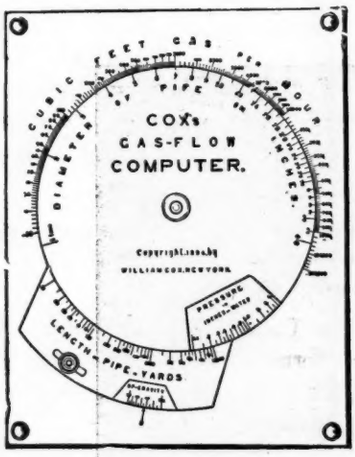

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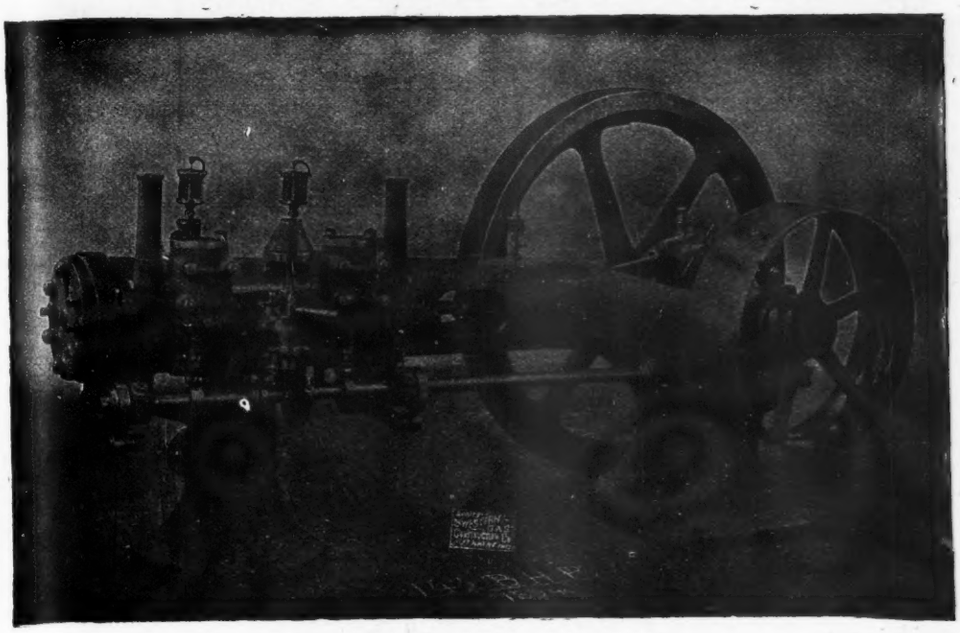

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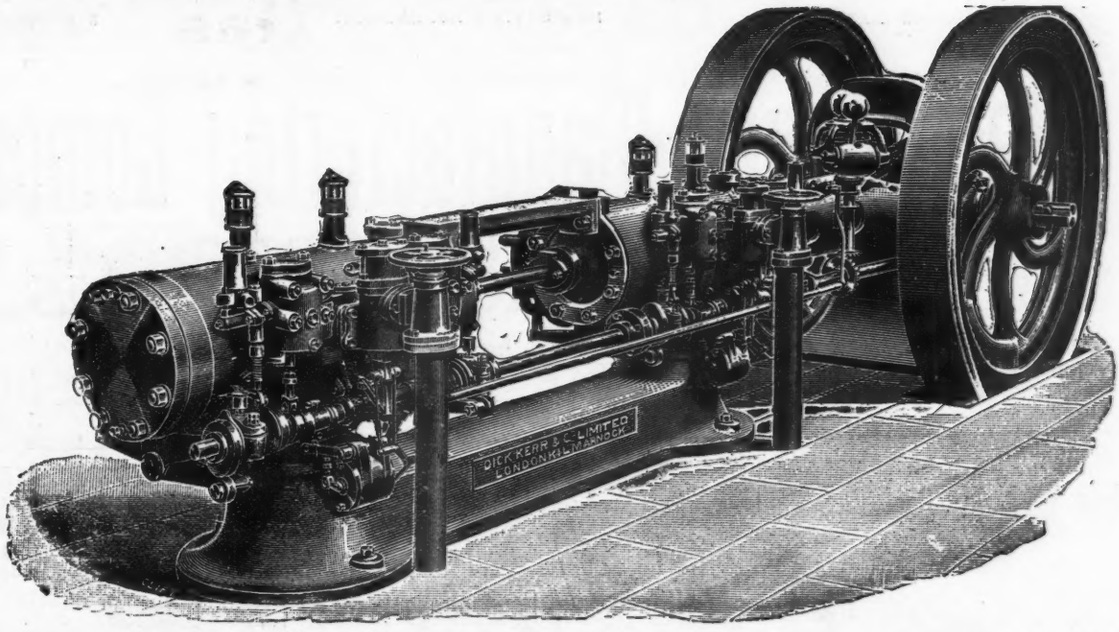

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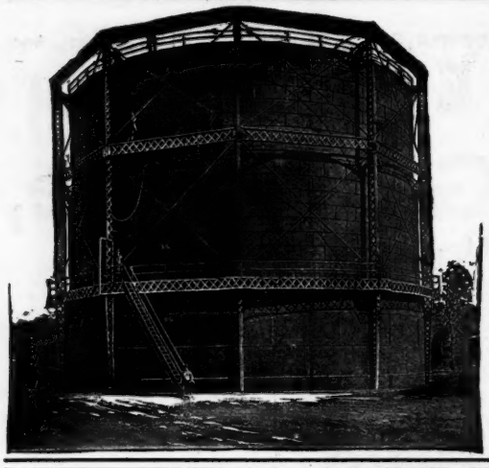

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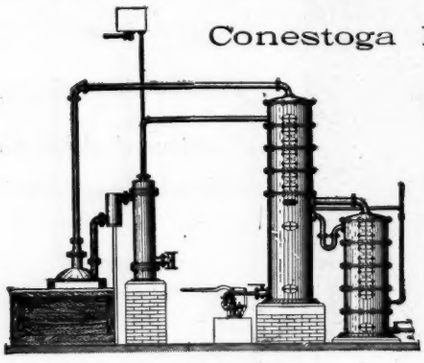

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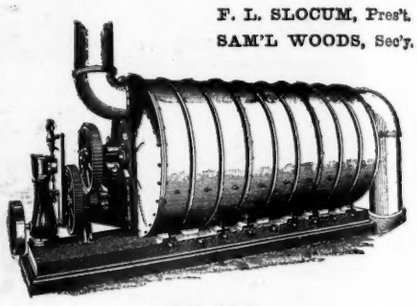

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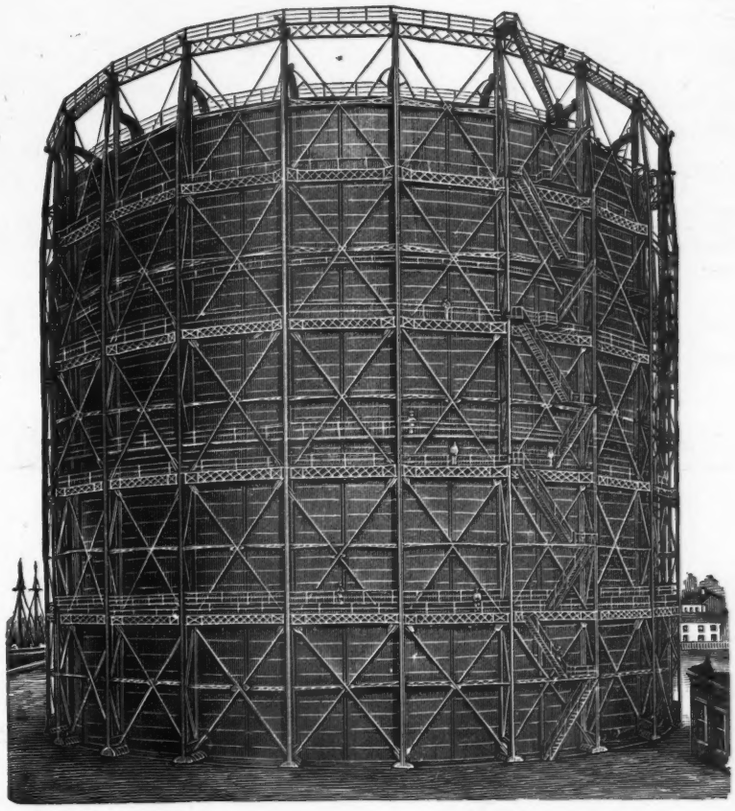

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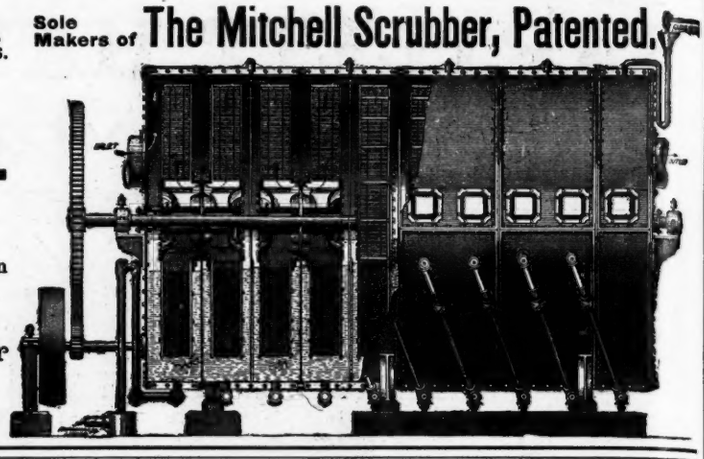

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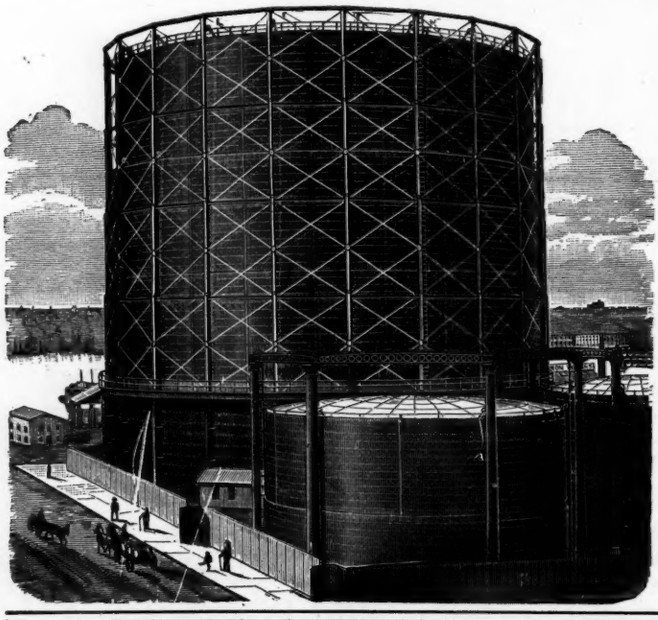

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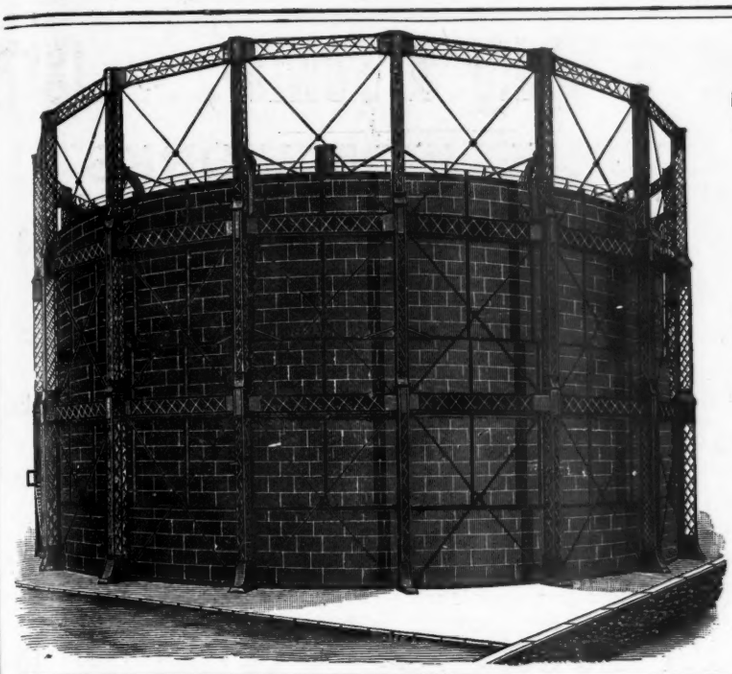

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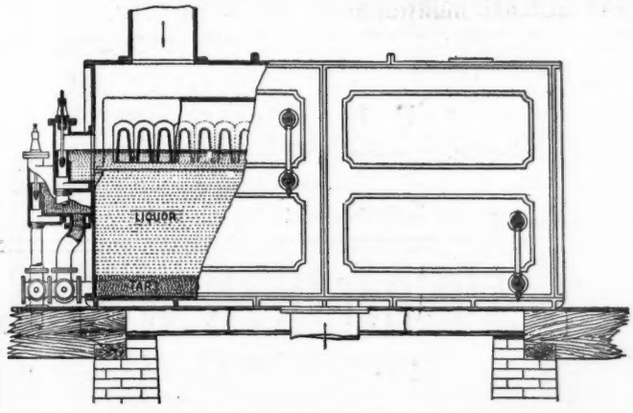

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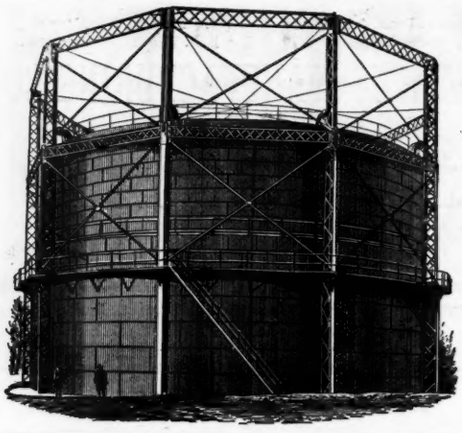

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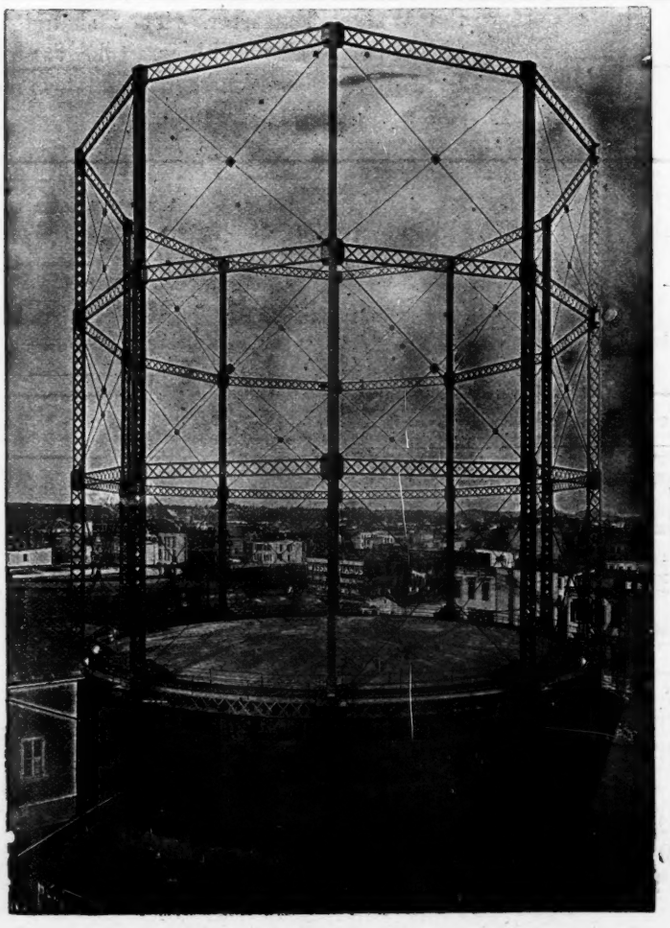

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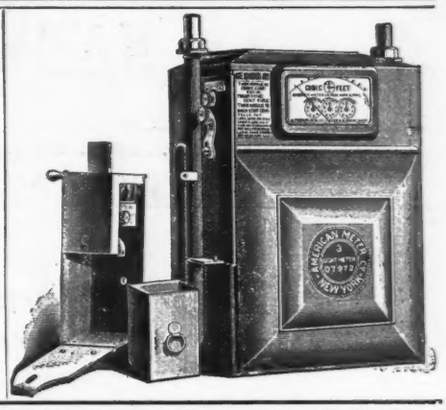

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